

Chemical Weekly

VOL. XXXIV

MAY 9, 1989

NO. 35

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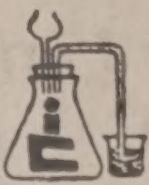
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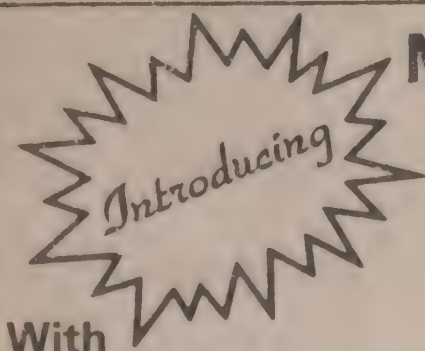
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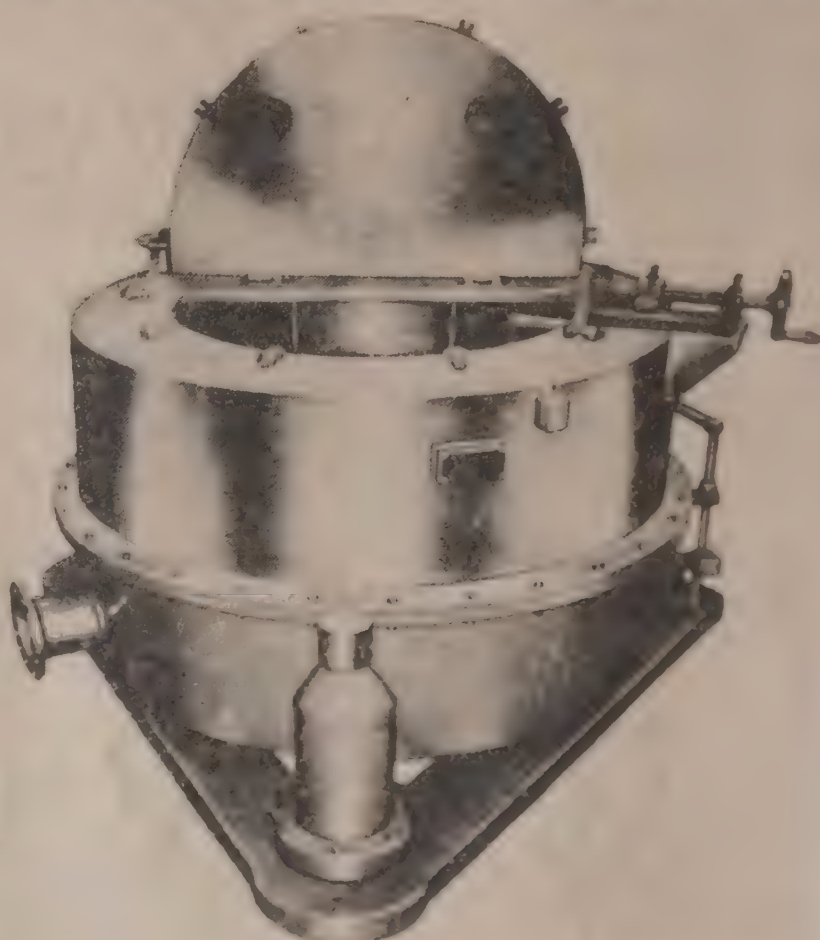


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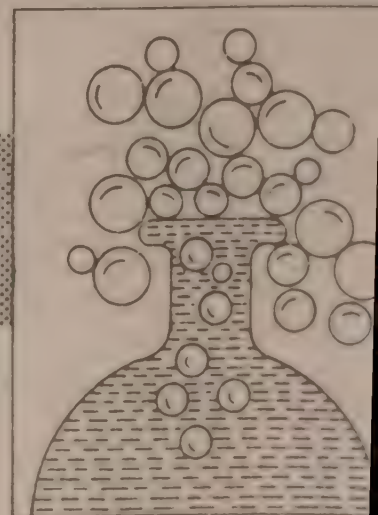
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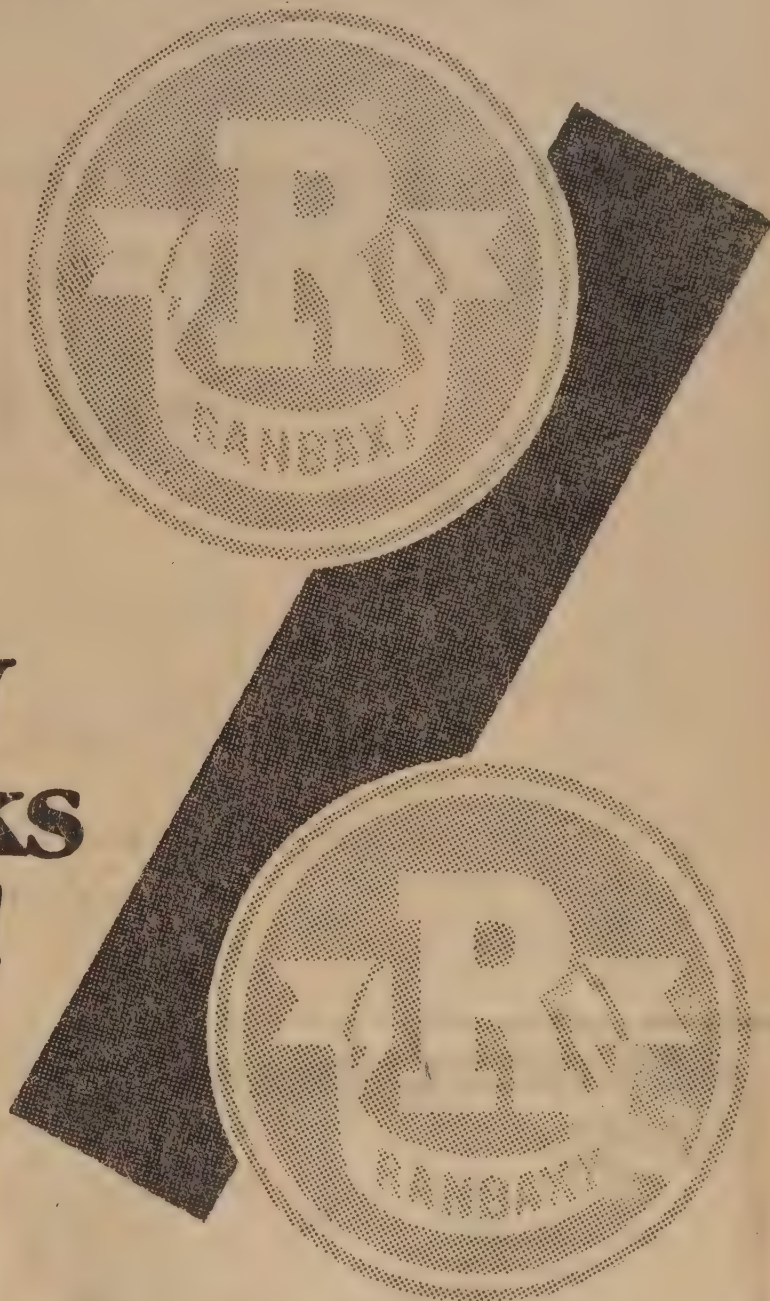
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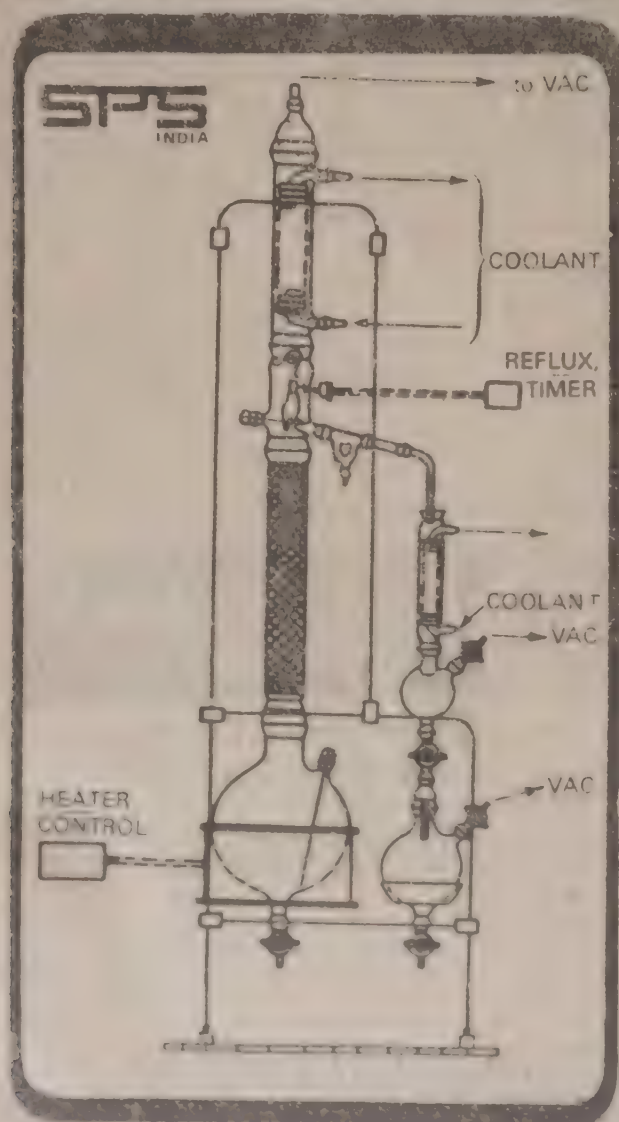
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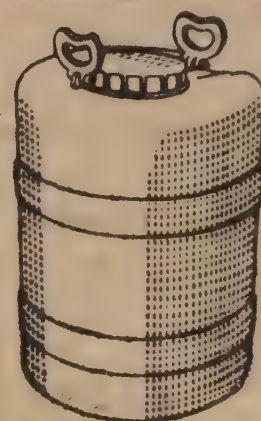
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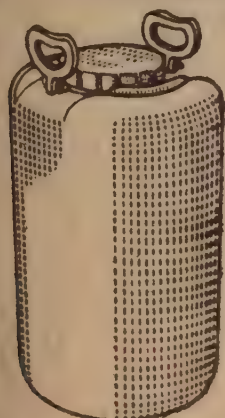
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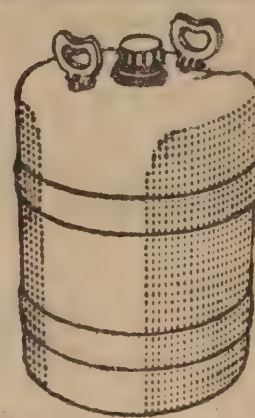
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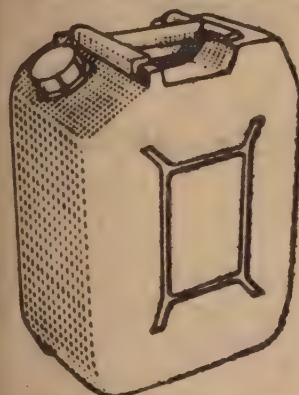
20 Kgs. Round Jar
- 6" Cap



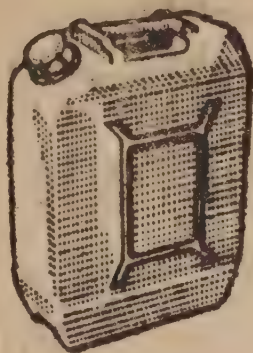
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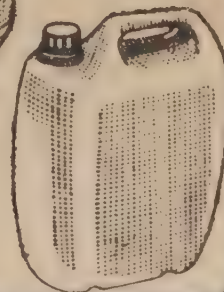
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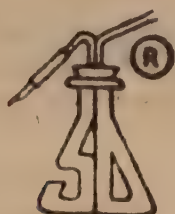
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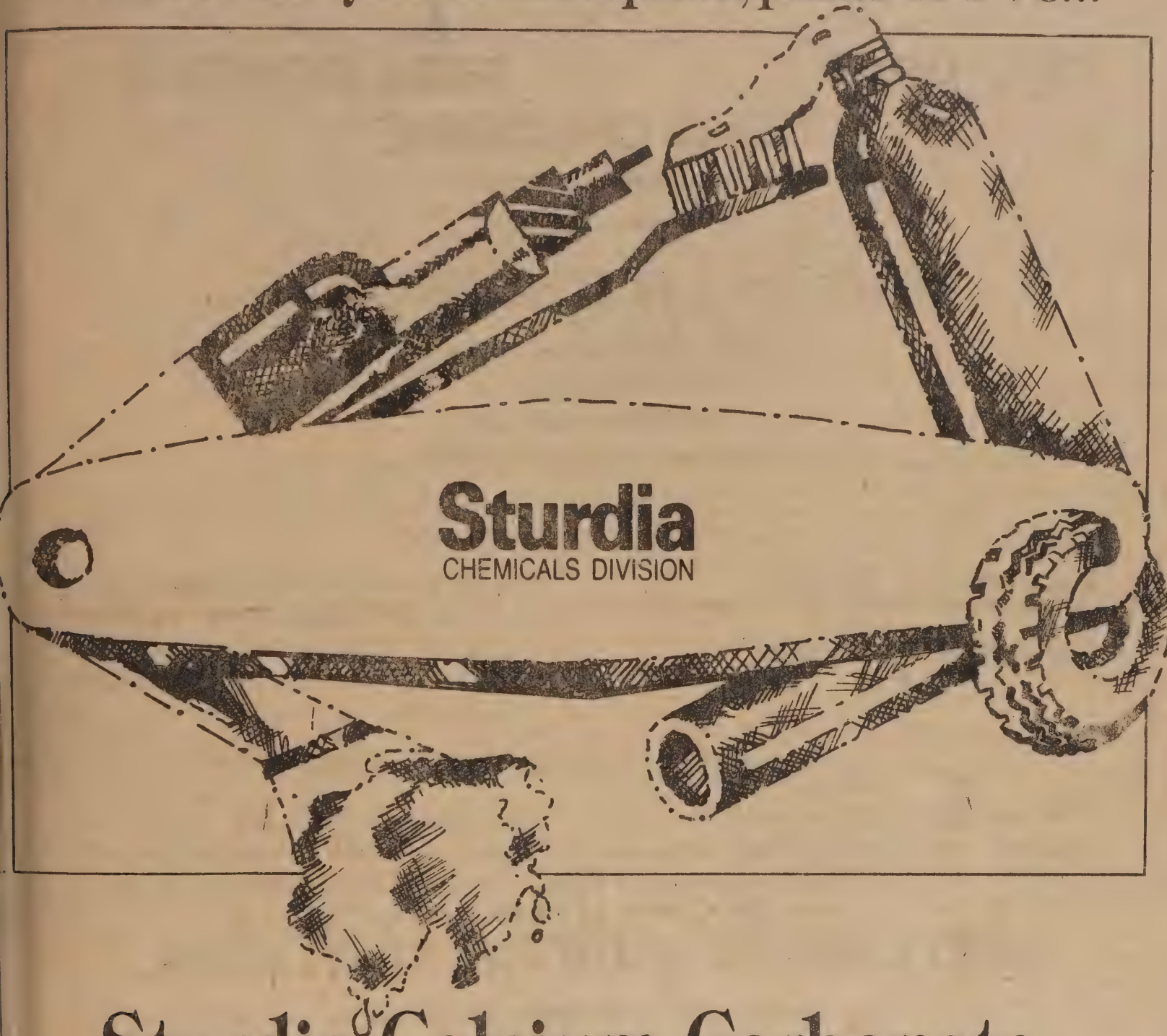
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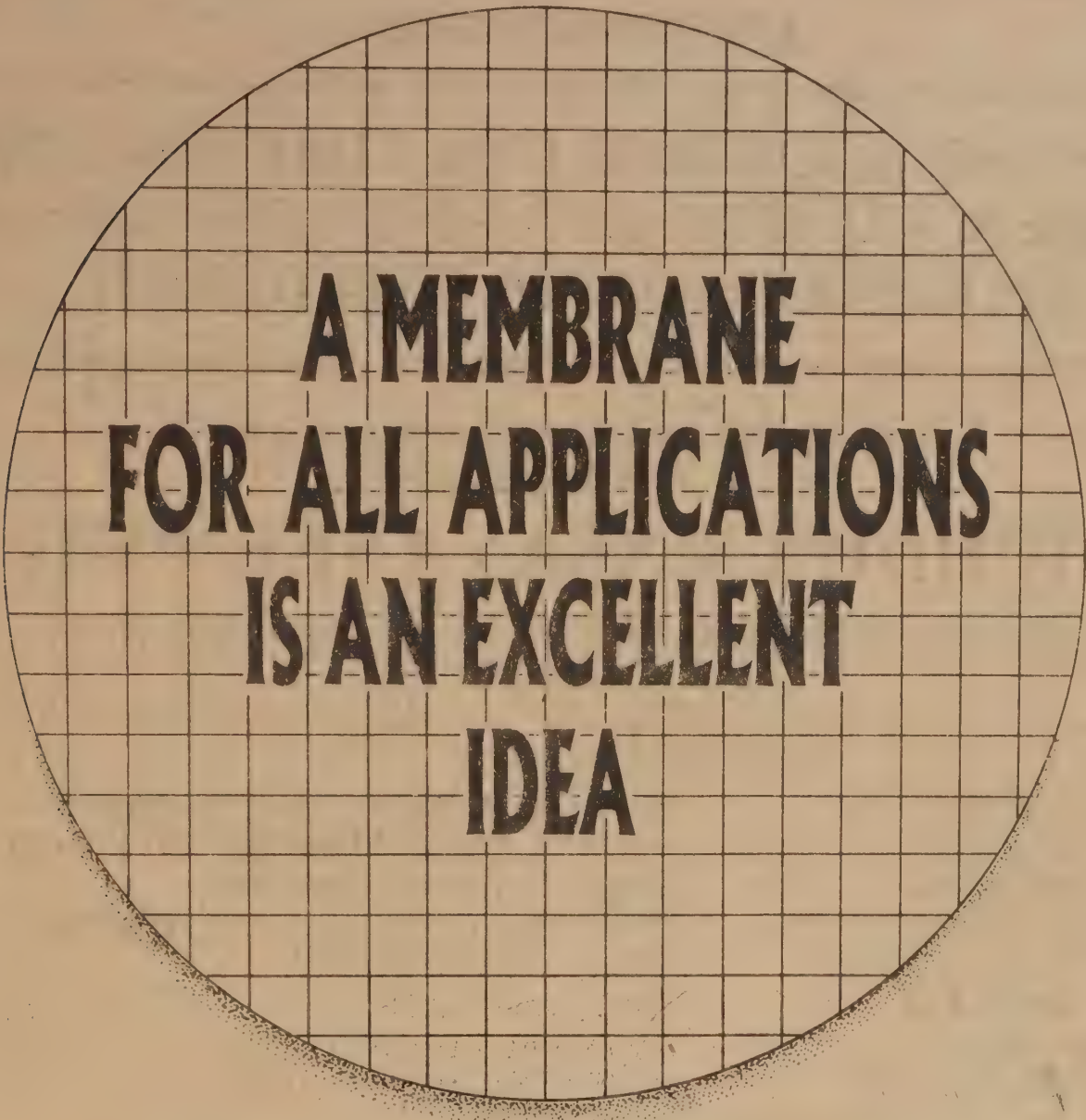
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HERALDING THE 21st CENTURY - 19

Emerging conflict between growing technology and the Concept of National Sovereignty

entire Industrial Revolution", says Dr. Carver Mead of the California Institute of Technology, "enhanced productivity by a factor of about a hundred," but "the microelectronic revolution has already enhanced productivity in information-based technology by a factor of more than a million -- and the end isn't in sight. The immense consequences of this technological revolution have not always been grasped by policy makers.

A very good example is the launching of the Sputnik on October 4, 1957, when Satellite technology changed the world forever. For politicians and policy makers, who were hugging on to the classical concept of control of air space could not and did not claim a loss of national sovereignty over space which was only a hundred kilometers over their own heads but high up in the sky.

The convergence of computers with telecommunications has spawned an information revolution. One observer, the journalist Mike Wallace, has said that this revolution is "hurrying the collapse of old structures, accelerating the velocity of social and political change, creating informed and politically active publics, and inciting conflict by emphasizing the differences between people and nations". "While the message may be different, people are the same the world over", is a simple message of the new era.

Scientific knowledge is currently doubling about every 13 to 15 years. The old industrial age is being slowly replaced by a new era of information society. This implies that like agriculture today, manufacturing will produce more goods for more people with less labor. It also means that the relative importance of intellectual capital invested in software and systems will increase in relation to the capital invested in physical plants and equipment. Traditional management systems designed for an earlier age no longer reflect what is actually happening, either in business or national economics.

The currently accepted tenets of national sovereignty, like so many other concepts, has evolved over time and naturally tends to change. Any change which may undermine its assumed authority. No one who lived through the Vietnam War can fail to understand the enormous impact that television had in frustrating the American government's objective in Southeast Asia. A general recognition that producing violent death is one thing, but witnessing the carnage of a battle or the body bags being unloaded at Dover Air Force Base on the television set is quite another. While debate will rage about whether Vietnam was lost on the battlefield or on the television front, few observers would fail to give at least some significant weight to television's impact on the citizens at home. Small

wonder that when the British were engaged in war over the Falkland Islands, they severely limited the press and television coverage of the hostilities.

In the absence of a major threat to the integrity of one's own borders or to the independence of the nation, one can at least question whether a democratic government operating in the full glare of television cameras could, in fact, conduct any sustained military operation that produces heavy casualties. If the answer is no, one important aspect of national sovereignty has been substantially altered.

The quality, speed and nature of information spread by the mass media has altered the relationship between the people and their government. Representative government in America is changing. Information technology has made it both possible and politically profitable for politicians to bypass traditional political structures that supported the orderly process of Government, and instead move toward the TV cameras to push a particular issue. As more and more leaders do this, the traditional cement of party discipline and consensus government begins to crumble.

If democratic societies face the problem of adapting to what amounts to a wholly new definition of sovereignty, closed societies like the Soviet Union will have a much more difficult time. Their problem is two-fold; first, communist regimes have always relied to some extent on their ability to control what their citizens see and hear. This control is now beginning to slip, and from the Soviets' points of view, the situation will get much worse. In addition to borders becoming increasingly porous to TV and radio transmissions, studies at Harvard's Center for Information Policy Research reveal that citizens of the Eastern-bloc countries have little difficulty in gaining access to VCRs; the number available in Moscow is growing daily.

The Soviet government's second major problem is whether the U.S.S.R. can continue to be a leader in science. Modern scientific research increasingly requires the ability to have access to huge data bases at remote locations. If access is limited to a very small number of scientists, progress will be slowed. On the other hand, opening up supercomputers and data bases to a large number of men and women obviously loosens the state's control of data. It is a very real Hobson's choice, and the dilemma will only get worse over time.

The phenomenon of eroding government control over the management of institutions and how citizens live and work is not

limited to closed societies, but is becoming increasingly evident in the West. The increasing difficulty of exercising this control in the information age as opposed to the industrial age was summed up, by the economist George Gilder.

A steel mill's massive output is easily measured and regulated at every point by Government. By contrast, the typical means of production of the new epoch is a man at a computer workstation, with access to data bases around the world, designing microchips comparable in complexity to the entire steel facility, to be manufactured from software programmes comprising a coded sequences of electronic pulses that can elude every export control and run a production line anywhere on the globe.

The advent of the silicon compiler, has opened "a great economic cleavage between the interests of entrepreneurs and the authority of natural governments". As technology continues to progress, the cleavage will widen. The growing inability of sovereign governments to regulate their affairs in the information age will have profound foreign policy implications.

Recently a private company forced a superpower to change its policy. This occurred when the government's monopoly on photographs from space was broken by the launching in February 1986 of the privately owned French satellite SPOT. When the picture of the Chernobyl nuclear disaster taken by SPOT appeared on the front pages of the world's newspapers, the Soviet Union was forced to change its story and admit that the event was much more serious than it had previously claimed. In this instance, the technology was not new, but the power to use the information shifted from the government to the private sector. However, the event posed a continuing dilemma; what SPOT revealed about Chernobyl, it can also reveal about American military sites. There is no American censorship of SPOT pictures, as there has been on a *de facto* basis of America's Landsat photos.

The policy dilemma posed by SPOT was further sharpened by the offer of the Soviet Union to sell high quality imagery, which has a five-meter resolution, to anyone beyond their borders who could meet the price. What is certain is that it will become progressively harder for nations to assert what is not true if the "spy in the sky" is not controlled by the government.

Another traditional aspect of sovereignty has been the ability of nation-states to issue currency and mandate its value. In the past, what kings said what their currency was worth was not always congruent with the facts. Technology now carries the markets judgments on the value of the currencies to all parts of the world within minutes. And politicians who wish to evade responsibility for the results of their imprudent actions on fiscal and monetary matters correctly perceive that the new Information Standard will punish them.

In the field of foreign policy, new technology is rewriting old concepts of sovereignty and over time will also change national objectives. As early as 1945, British Foreign Secretary Anthony Eden noted that "every succeeding scientific discovery makes greater nonsense of old-time conceptions of sovereignty". Eden was among the first leaders to recognise the impact of technology on national sovereignty.

In more recent times, even the most jaded diplomat might have to concede that the balance of power in the world shifted decisively on July 16, 1945, in the desert at Alamogordo, New Mexico, when the first atomic explosion took place. (For the modern Luddites who explain almost daily that the Strategic Defense Initiative will not work, it is useful to remember that almost half of the scientists at Los Alamos thought the atomic bomb would not fire). When it did,

relations between nations were instantly altered and, indeed, the very survival of our planet came into question. The process works both ways; scientists suddenly also discovered the desirability of a world framework of international law and order to protect society from their own discoveries.

One geographical fact is that it is vital for a country to have assured access to certain critical raw materials. Countries having these desired natural resources within their borders are therefore of strategic importance to the United States. The oil-rich nations of the Middle East are the most obvious examples, but there are other countries whose soils contain important minerals ranging from copper to titanium to uranium.

Not that long ago, armies fought and men died for control of the iron and steel in the Ruhr Basin because ownership of these assets conferred economic and political power. To the extent that new technology replaces once essential commodities with plastics or other synthetic materials, the relative importance of these areas to the vital interest of nations is bound to change.

When World War II cut the United States off from a supply of natural rubber from the Far East, it turned to synthetic rubber, the basic research on which had been completed before War I. The technology had not been exploited because it was too expensive. The war emergency caused it to set aside economics in order to produce tyres, but as they went up the learning curve, production costs were driven down. When they reached the point where synthetic rubber became cost-effective, the significance of rubber producing countries to the US strategic interests tended to decline.

Today, as fiber-optic cable replaces the twisted copper pair, the relative strategic importance of copper-producing countries will also shift. Sand, the most common substance in the world, is the raw material for computer chips. Clay is the base for superconducting ceramics that will speed data by a factor of a hundred, generally enhance the power of magnets and thus further shift the value of traditional natural resources. Over a period of years, this same pattern, in various degrees, will continue to apply to other natural resources, even oil.

As scientific advances continue to unfold, diplomatic priorities are bound to change. Even the strategic importance of critical areas of the world is altered by technology. It was not so long ago that conventional wisdom held that lights would go out all over the world if the Suez Canal were ever to be closed. However, conventional wisdom did not take into account the technology that would allow the building of huge supertankers able to carry oil economically around the Cape of Good Hope. This feat was achieved by relatively simple technology, but it altered the importance of the physical control of a specific territory.

Today the velocity of change is so great in all aspects of science, technology, economics and politics the tectonic plates of national sovereignty and power have begun to shift. Political scientists and statesmen are fond of remarking that generals usually prepare to fight the previous war. Now the policymakers may be guilty of similar errors. If today's leaders in government and business fail to recognize that the world has changed because what they see, in Tuchman's words, "does not fit in with their plans or suit their pre-arrangements," they will follow into oblivion a long list of leaders who have made similar mistakes. Those who can understand and master change will be tomorrow's winners.

-- T.P.S. RAJAN

(Extracted from Walter B. Wriston *Technology & Sovereignty* "Foreign Affairs", Winter 1988-89).

CHEMARENA

S.L. VENKITESWARAN

Economies of Scale

In the recent two years there has been an obsession by the Government on economies of scale in chemical plants. The Kapur Committee for Perspective Planning for Petrochemical Industry has important recommendations relating to minimum economic scale of units. The Committee wants that lower capacity units should not be normally licensed. Also the capacity should not be treated as limiting and larger capacities should be permitted. The minimum capacity norms also should be reviewed frequently and revised where required. Plants with obsolete technology should update themselves by selective and marginal import of technology and also impose their efficiency. Factors like transport or logistics of raw materials are important, making it necessary to concentrate petrochemical units near refineries, for example.

In the wake of the Kapur Committee Report, Dr. Ganguly Committee laid down the norms of capacity for a number of petrochemicals and allied chemicals. While the Minimum Economic Capacity levels recommended by Dr. Ganguly are yet to be implemented -- for there are many problems in the case of existing units of lower capacities, we find another shift that the M.E.S. already approved needs to be revised upwards by 25 to 100% and these revised M.E.S. are to be notified soon. The list as published in *CHEMICAL WEEKLY* of April 11, is given in the Table alongside, as per percentage of revision.

In regard to the ammonia and urea plants we have already several units with capacity as high in the developed countries and oil-rich centres but do not have any specific advantages in costs. Reasons of much higher capital costs and financing charges and higher costs of inputs as compared to assumed international price levels are said to be responsible. By specifying international competitiveness as the objective in revising minimum capacities of our plants are we really likely to attain this objective when reasons such as those given for our fertiliser plants would continue to hold good. Even earlier when IPCL was established with the then norms of MES the result has been that there was no wide difference in prices of products marketed by them vis a vis others producing in smaller capacity plants. Is it not likely that the MGCC which needs four times as much investment on the tracker of double the IPCL capacity despite using gas as feedstock, will also end up at the same high price levels as at

present? Another case referred to by Shri D.M. Trivedi in his article in the *Chemical Business Annual* is of polyester fibre/filament industries. The advent of Reliance with 3 to 5 times of the capacity of earlier plants made no difference in prices.

Table

Item	Existing MEC	Revised MEC
TPA		
100% and above		
Polyester Staple	30,000	60,000
HDPE Slurry process	50,000	1,00,000
HDPE Swing process	50,000	1,60,000
PP	50,000	1,00,000
ABS	5,000	20,000
PTA	1,00,000	2,00,000
PO/Propylene Glycol	12,000	25,000
50 to 100%		
Polyester Filament Yarn	15,000	25,000
Acrylic Stable	12,000	20,000
MEG	60,000	1,00,000
Below 50%		
Nylon FY	12,000	15,000
LDPE	80,000	1,00,000
LLDPE	60,000	80,000
Polystyrene	30,000	40,000
LAB	60,000	80,000
Acrylonitrile	60,000	70,000
Phthalic Anhydride	15,000	20,000

Government in its anxiety to march in step with the world is laying down norms and revising them frequently for approval of capacities. There is an apparent lack of appreciation of all factors which affect economies of production in the country and what results is a mere arithmetical or computer exercise. Capacity utilisation levels and breakeven points are extremely critical, more so in mega plants. The large expanse of India's markets and the add-up between costs

at a central single location on grounds of minimum economic capacity stipulation and delivered prices can defeat the very purpose of such a policy. In the case of products made by alternative processes and or raw materials there are differences in production costs which are substantial and can confer an advantage to smaller capacity plants. The grades of products made can make a big difference as for example special grade of LDPE for cable cover or special grades of PVC -- for such production, smaller capacity plants are fully justified.

In the above list some points are rather absurd. ABS capacity level is to be quadrupled and this has no relation to demands or raw material availability with the possibility that two or three units will be shut down. There is also little logic in stipulation of nominal increase for some items such as Nylon FY, LDPE, Polystyrene, LAB, Acrylonitrile.

The main deficiency of the policy on MES is that no norms are indicated except a vague phrase like international competitiveness. Are we to aim at a cif price level plus thirty or fifty or even above hundred per cent for some of the important chemicals and polymers for the domestic market? Are there any norms on taxation levels such as sales tax at various levels which add on to the ultimate costs? Are we to safeguard against possible mishaps or labour and other dislocation shutting out our only unit set up at MES levels by going in for two or more plants at lower capacity levels? Are not factors such as integrated programmes for multiple products from a complex where even smaller capacity plants are made viable through adjustment of costs or prices over a spectrum of products to be taken into account? Should not the basic objectives of regional development be kept in mind when capacities below assumed economic levels be justified in specific cases? In the case of PVC, there are multiple factors which effect economies besides the VCM and PVC capacities. Availability of chlorine at site and its price; market for caustic soda in the area; power supply and tariff; the olefine source and costs; the grades and method of polymerisation etc. The only technical point is the use of oxychlorination for part of the EDC using hydrogen chloride and for which perhaps 25,000 to 30,000 tonnes a year is minimal. In the case of styrene, a source for ethylene from alcohol at about Rs. 2 per kg lower than from cracker, would compensate for a much lower capacity of 30,000 TPA as against 100,000 TPA prescribed.

One of the main problems is on upgradation of capacity and modernisation of existing units. This is dependent on a

complex of factors and the possibilities of doing so vary widely. We cannot for example step up capacities of small ammonia or methanol plants except marginally through better catalyst and heat exchange arrangements. For a 300 TPA ammonia plant or a 50 TPA methanol plant there is no way it can go upto 1000 TPA ammonia or 300 TPA methanol except by scrapping and building anew. A cracker for 200 TPD naphtha cannot be stepped up or converted into one of 3,000 TPD to make 3 to 4 lakh tonnes of ethylene (plus co-products) using the latest minisecond cracking system. Scrap and rebuild has been the way Japanese go about it and not for sustaining uneconomic units. But the costs are enormous both due to the present rupee value and inflation factors and higher interest rates and costs of materials. It is all right to say that older low capacity plants should be stepped up and upgraded in technology but this is an arduous task of high financial dimension and the ways in which this could be achieved have to be clearly spelt out by the party to get approvals of the revised capacity.

The licensing system more often is used for preempting capacity for specific items and the new policy of MEC and diversification or technology upgradation should not be one more way of preempting capacity. Certain measures have to be completed in a specific time frame e.g. sulfuric acid plants to go up to 300 TPA or higher with the double absorption system; caustic soda plants to adopt membrane cell technology.

The task which we face cannot be reduced to simple rules of thumb in terms of capacity stipulation. The specific objective of price levels and relative costs with alternatives require to be clearly spelt out. Capacity increase may not reduce costs if for example the raw material requires to be transported over longer distances and produce similarly marketed over a much wider area. Every product has its own background and constraints which need to be evaluated before expansion and or technology shifts. As Mr. Trivedi remarks -- "Apart from the basic dilemma of technology change, the problem of expanding the unit capacity at the same location by doubling or trebling the unit capacity using a new technology package only for expansion will gravely dilute the potential benefits of added capacity in spite of increase in the volume of production due to obsolescence of existing unit. -- The fallacy of updating existing plants and/or their expansion with marginal inputs of technology will be obvious". The costs involved and resources available invariably tend to be ignored and progress gets distorted -- let not the capacity norms be one more instrument in this.

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GNFC'S ACETIC ACID PLANT

No decision yet on proposal

The government has not taken a final decision on the proposal of the Gujarat Narmada Valley Fertiliser Corporation (GNFC) for setting up a methanol-based acetic acid plant. The GNFC proposal is still under consideration, especially its proposed foreign collaboration. This was stated at New Delhi by Union minister for industry Mr. J. Vengala Rao on April 26, while addressing the parliamentary consultative committee attached to his ministry.

According to Mr. Vengala Rao, the GNFC project is expected to cost Rs. 88 crores including a foreign exchange component of Rs. 35.14 crores, mainly as a technology package and licence from B.P. Chemicals, UK. The minister told members that the present installed capacity of acetic acid was around 1,10,000 tonnes per annum (tpa), all based on alcohol. Against this the demand was estimated at 80,000 tpa. By 1991-92, the demand was expected to shoot up to 1,20,000 tpa. It would reach 1,75,000 tpa with the commissioning of the PTA plants at Madras and Saleempur in the next five years.

Members felt that as alcohol and molasses were available in plenty, it was not desirable to grant a licence for the methanol-based plant. The minister said the government had earlier appointed a committee, under the then chairman of Indian Petrochemicals Corporation Limited (IPCL), Dr. S. Ganguly, to go into the availability, pricing and merits of producing acetic acid both from alcohol and methanol.

The report, which was submitted in early 1988, took note of the easy availability of alcohol during the last few years and recommend that if the situation continued, there would be no need for an acetic acid plant based on methanol. Accordingly, it was recommended that permission for expansion of existing alcohol-based plants should be liberally granted and the availability situation would be for another year. If the alcohol availability continued to be sat-

isfactory, then, the report said, there would be no need for a methanol-based plant. In line with the recommendation, the government, the minister said, had sanctioned a very large capacity on alcohol route. These were under various stages of implementation and it was expected that adequate quantities of acetic acid would be available in the country in 1989-90.

Referring to the small-scale sector in general, the minister reiterated the government's commitment to safeguard its interests and to ensure its proper growth.

CENTRE CLEARS 4 GRASIM PROJECTS

The Union government has approved four projects of Grasim Industries Limited, belonging to the Birla group, worth Rs. 20 crores.

The projects relate to the manufacture of chlorosulphonic acid, poly aluminium chloride and the installation of 25 shuttleless looms. The fourth project covers doubling of capacity for making stable bleaching powder.

According to official sources, all the four projects will be located in Madhya Pradesh. For doubling its existing capacity of 10,000 tonnes per annum (tpa) of stable bleaching powder, the company proposes to spend Rs. 3 crores. The project is expected to be financed through borrowings and debentures valued at Rs. 2.4 crores and the balance will come from internal generation.

The company maintains that of the total installed capacity of 10,000 tpa, the existing production of stable bleaching powder since August 1988 is around 9,000 tpa. It has argued that its proposal for expansion involves utilisation of chlorine, a by-product in its existing plant into a useful product.

In addition, chlorine poses a problem in regard to its disposal. The government approval is subject to the condition that the company will export 25% of its production for at least eight years.

The project is located at Birlagran Nagda, MP.

Another proposal relates to the establishment of a new unit by Grasim Ind for making 13,860 tpa poly aluminium chloride. The project cost is placed at Rs. 3.36 crores.

Of the total cost, internal accruals will account for Rs. 1.10 crores, foreign currency loans for Rs. 1.11 crores and the balance will be raised from banks and financial institutions. The project will be set up at Ujjain, MP.

The company had originally placed the project cost at Rs. 3.03 crores. Later it approached the government for permission to modify the scheme of finance.

Originally, the company proposed to raise Rs. 80 lakhs through debentures, Rs. 82 lakhs from banks, Rs. 78 lakhs from foreign currency loans and the balance from internal accruals.

Sources said the company attributed the change in the mode of financing to the fluctuation in the exchange rate. Also, the amount to be raised through debentures was thought to be too small.

Yet another project for which the government has given the go ahead to Grasim Industries is for the setting up of new unit at Ujjain to manufacture chlorosulphonic acid. The project, with a capacity of 6,600 tpa, will cost Rs. 2.9 crores. In this case, the company had originally sought permission for investing Rs. 3.21 crores.

In the revised proposal, the company brought down the originally envisaged expenditure on imported machinery from Rs. 1.90 crores to Rs. 27 lakhs. Conversely, indigenous machinery cost has been raised from Rs. 1.18 crores to Rs. 2.52 crores.

The company maintained that there will not be any import of capital goods now as the necessary plant and machinery will be manufactured in India as per the design provided by its foreign collaborator.

The company had originally proposed to raise Rs. 142 lakhs through debentures to finance its project. It now feels that this amount is very small.

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CHEMICAL PRODUCTS

Exports may touch Rs. 3,000 crores mark

Exports of chemical products during the current financial year are expected to soar to Rs. 3,000 crores, a 50 per cent increase over the level of Rs. 2,000 crores expected for 1988-89. In addition, the government is planning for ambitious export targets for the Eighth Plan.

This was stated by Mr. M.S. Gill, secretary, Department of Chemicals and Petrochemicals recently. Addressing a conference on chemical exports, he said, during 1988-89, exports were expected to overshoot the target of Rs. 1,900 crores by Rs. 100 crores. This would be against exports of Rs. 1,281 crores realised in 1987-88. The conference was held under the aegis of the Indian Chemical Manufacturers' Association (ICMA).

Mr. Gill said that the government was paying special attention to product groups which had been facing shortages and which are the key to export production. He said the government had been liberal in giving additional licences for acetic acid, nitro-benzenes, concentrated nitric acid, sulphuric acid and methanol. Accordingly, most of the shortages that were being faced by exporters in the last two years would gradually disappear this year.

Referring to molasses and alcohol, Mr. Gill said considerable quantities would be allowed for exports this year though this would be done only after providing enough to meet the requirements of the domestic industry. During the last financial year, government allowed ten lakh tonnes of molasses and 120 million litres of alcohol for exports. Although progress of actual exports was not very satisfactory due to the late start, it was likely to improve considerably this year.

The conference, attended by leading manufacturers and senior officials of

the Department of Chemicals and Petrochemicals and others, discussed papers on the pricing of petrochemical exports (by Mr. V.P. Kaushik, vice-president, petrochemical division, United Breweries, and Mr. Anand Swaminathan, head of the division in the same company), speciality chemicals and custom analysis (by Dr. H.K. Gharda of Gharda Chemicals), export potential for inorganic chemicals (by Dharamsi Morarji Chemical Company Ltd.) and export potential for dyestuffs and intermediates (by Indian Dyestuff Industries Ltd.).

In their paper on petrochemicals, Mr. Swaminathan and Mr. Kaushik maintained that the country could achieve near self sufficiency in petrochemicals and that the net outflow of foreign exchange, at the industry level, could be brought down to practically nil.

This, they said, could be done by adopting a pragmatic approach towards pricing of petrochemical products. The main planks of the approach suggested in the paper were need for installing complexes comparable to international levels, size and technologywise. If indigenous naphtha is not available in sufficient quantities, it should be imported. Indian projects at present cost 60-70 per cent more compared to those on the US Gulf coast. The cost could be brought down by abolishing all duties and taxes on capital goods and technology. This would make indigenously produced polymers highly competitive in the international market. One could then earmark 20 to 25% of indigenous polymers and processed polymer production for exports. As value addition at this stage was 6 to 10 times more than that feedstock, this level of exports could cover the import bill on feedstocks, capital goods and technology.

The paper on speciality chemicals stressed the fact that India had captured

a significant share of the world market particularly in drugs and agro-chemicals which were off patent. Mr. Shyam Sundar, joint secretary, Department of Chemicals, felt that many companies abroad were not interested in selling their technology to India especially in custom synthesis. Foreign companies now wanted India to change its Patents Act which was not acceptable to the country. At the same time, if product patent is not granted, problems about sharing technology crop up.

In South Korea, for example, he said after that country agreed to change its Patent Act in favour of product patents, the industry had gained tremendously. Have we come of age in this regard? This was the question that needed to be debated. At the same time, he was quite categorical about the fact that India would not sign the Paris convention and there was no question of amending its Patents Act.

TITANIUM DIOXIDE: KERALA CONCERN OVER COMPETITION

Kerala is fast losing its monopoly over the production of certain items like titanium dioxide and white cement. This was disclosed by the State Industry Minister, Mrs. K.R. Gowri. She cautioned that this is not a welcome trend and could extend to a few other products on which the State has a near monopoly. Recent developments have led to stiff competition. The State is now forced to compete with big industrial houses, she added. Mrs. Gowri pointed out that for several years titanium dioxide produced by the State Govt-owned Travancore Titanium Products in Trivandrum and white cement manufactured at Travancore Cements in Kottayam have been Kerala's monopoly. But these two units are facing severe threats in the wake of large units entering the fray. Mrs. Gowri disclosed that the Govt. of Maharashtra is setting up a titanium dioxide project. The Maharashtra Govt. has decided to enter into a collaboration agreement with the Soviet Union in this regard.

Clearance soon for 5 TIDCO projects

The Tamil Nadu Government will shortly clear five projects with an investment tag of Rs. 224 crores provided by the Tamil Nadu Industrial Development Corporation (TIDCO). The project lines will be titanium dioxide, tungsten metal powder, connectors, ceramic micanites and mineral separation. The projects will be in addition to the projects taken up for implementation last year at a cost of Rs. 236.9 crores.

According to an official policy note, the Government is also considering projects worth Rs. 1,300 crores to manufacture penicillin, float glass, polyester fibre/filament, petrochemical downstream products, sponge iron and power generation.

It is stated in the policy note that TIDCO has been permitted to raise the rate of interest on public deposits by one per cent to mobilise additional funds. It has already reached the maximum level. Another State undertaking Tamil Nadu Magnesite Ltd. (TANMAG), is awaiting IDBI assistance for its chemical beneficiation plant being implemented with Swiss knowhow at an estimated cost of Rs. 105 crores. The company has already spent Rs. 7.25 crores so far and the State Government has also released Rs. 7 crores towards equity share.

TANMAG is negotiating with SAIL to participate in the venture on a joint venture basis. It is also taking steps to establish a refractory brick plant at a cost of Rs. 52 crores with Austrian knowhow. For the Sivaganga graphite project being set up by the Tamil Nadu Minerals Ltd., the Government has engaged Engineers India Ltd. (EIL) as project consultant. Earlier, it was planned to team up with a West German firm.

But, now the Government feels the project cost can be pruned to Rs. 10 crores from the original Rs. 25 crores. The projects will be taken up for implementation

in the current year after the feasibility report is submitted by EIL.

MPCL BOARD RECONSTITUTED

Considering the growing importance of petrochemical industries and the need for accelerating the promotion of such industries in the State, the government of Maharashtra has reconstituted the board of directors of Maharashtra Petrochemicals Corporation Limited (MPCL), a company incorporated in 1981, in view of the industry's importance. Mr. V.G. Rajadhyaksha, who was formerly member of the planning commission and is presently member of the state planning board, has been appointed as chairman of the corp.

The other members appointed on the board include Dr. Homi Sethna, chairman, Tata Oil Mills Co., Dr. M.S. Patwardhan, Vice-Chairman of NOCIL, Mr. S.M. Kulkarni, executive director of

RPG Enterprise, Dr. A.N. David, managing director of Humphreys & Glasgow Consultants, Prof. M.M. Sharma of the Department of Chemical Technology, Bombay University, Dr. S. Ganguly, executive vice-chairman and managing director, ACC, Mr. S.G. Kale, secretary (industries), Maharashtra, Mr. A.W. Bhadkamkar, development commissioner (Industries), Mr. V.S. Gopalakrishnan, managing director, SICOM and Mr. P.P. Godshalwar, chief executive officer of MIDC. Mr. A.K. Mago will continue as the managing director of the corporation.

TN SETS UP PANEL ON PESTICIDES

The Tamil Nadu Government has set up a high-level committee to certify the quality of pesticides. This has been done after revoking the one-time certification as it has led to the spread of spurious pesticides, according to Mr. K.S. Mani, Minister for Agriculture.

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High-power panel on drug prices likely

The government is thinking of setting up a high-power committee to go into the recommendations of various committees on drug prices, Union health minister Shri R.N. Mirdha informed the Rajya Sabha.

Answering supplementaries during question hour, Mr. Mirdha said the national drug policy was working successfully and the prices had come down.

Earlier in a written answer, Ms. Saroj Khaparde said that the health ministry had not recommended calcium for price control since it was not used in any national health programme. Iron and folic acid tablets were initially recommended for price control since these were used in the maternal and child health programme.

Later a shorter list was sent to the ministry of industry in which iron and folic acid tablets were not included, she said. She said that folic acid was included in the second schedule. Formulations including folic acid come under price control, she said.

Ms. Khaparde said that the Kelkar committee had opined that the ferrous salts be excluded from price control as these were plentifully available at competitive prices. The scrutiny made by this committee had also revealed that a majority of the formulations of calcium and iron were in combination with the scheduled drugs and consequently would come under price control. The ministry of industry had stated that there had been a reduction in price of formulations containing calcium and iron due to government intervention.

She said that there was a provision under the drugs price control order, 1987, that the government would intervene in the interest of consumers whenever there was an undue increase in price even for the decontrolled category of drugs.

Ms. Khaparde, said that the government found no adequate basis to recommend withdrawal of the drug Analgin from the country. Replying to supplementaries during question hour, Ms. Khaparde said, no conclusive statement could be made on the basis of studies available so far on whether the use of Analgin led to disorders resulting in a damage to the bone marrow. She said the drugs technical advisory board took note of the Boston study for monitoring adverse reaction from Analgin. The government went by what the medical experts said.

Analgin was being used in about 71 countries including France, West Germany and Italy. There was no unanimity among developed countries on banning the use of Analgin. While one developed country banned the drug, it could continue to be marketed by another, she said.

FOUNDATION STONE FOR IBUPROFEN PLANT LAID

If the issue of intellectual property rights comes under the purview of GATT, as was envisaged during the recent Geneva discussions, transfer of technology would become difficult for all the developing nations. If decisions are taken to go under the "tutelage" of GATT, it would adversely affect the growth rates of all the developing nations, including India. The industrialised nations will gain an upper hand and this could affect the socio-economic-political fabric of the entire developing world.

These views were expressed by Union Minister Mr. P. Shiv Shankar while laying foundation stone for the Rs. 6.11 crores bulk drugs project of Sumitra Pharmaceuticals and Chemicals Ltd. (SPCL) at Digwal village in Medak district 90 km from Hyderabad. Earlier addressing the gathering Mr. Ramesh Jain, managing director, SPCL said the

project has many unique features. A licenced capacity of 2000 tonnes annum of ibuprofen, the plant could grow to become the largest in the country. It was appraised by SBI and SBI Bank of Hyderabad jointly even as cost was above Rs. 500 lakhs and term loans would be of the order of Rs. 100 lakhs. The balance will be issued to the public in the form of equity and convertible debentures.

The issue is expected to come up in mid-July following CCI approval, Mr. Jain said. The project is expected to be completed within eight months.

RESPRO CHEM UNIT INAUGURATED

'Respro Chemical Industries Pvt. Ltd.', a subsidiary to the Chemiesynth group, at Vapi was inaugurated on May 9 by Mr. P.P. Rathod -- Vice Chairman and Managing Director of Gujarat Industrial Development Corporation.

Chemiesynth group is expanding their capacities of Nitro Chloro Benzene range of intermediates from the present 350 tons per month to 800 tons per month. This includes 200 tons per month of Para Nitro Chloro Benzene, 550 tons per month of 2:4 Di Nitro Chloro Benzene and about 50 tons per month of 3:4 DCNB. These 4 intermediates are widely used by dyes and pharmaceutical manufacturers.

Chemiesynth (Vapi) Pvt. Ltd. was established in 1973 at Vapi. The company has been engaged in the manufacture of Nitro Chloro Benzenes and allied products mainly used as intermediates.

The company had to struggle against the dumping of material from China. Through constant endeavouring, the company not only successfully overcame the problem of imported material, but has now entered the international market in a big way.

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Erythromycin tablet price cut

The government has abruptly cut the ceiling prices of erythromycin stearate tablets after hiking the price of erythromycin stearate bulk by 25% two months ago. The price of erythromycin stearate bulk was raised to Rs. 2,076 per kg from the level of Rs. 1,648 per kg considering the escalation in the cost of bulk drug manufacture.

Subsequently, by another notification, issued a few days ago, the government has brought down the ceiling prices of erythromycin stearate tablets. The ceiling price of a strip of 10 tablets of 100 mg base has been reduced to Rs. 6.96 from Rs. 7.27. The price of a 10-strip pack of the same drug with a strength of 250 mg has been reduced to Rs. 16.68 from Rs. 17.34. The ceiling price of a bottle of 100 tablets of erythromycin was reduced to Rs. 165.14 from Rs. 171.74.

In fact, after an upward revision of the bulk drug price, a corresponding increase in the prices of various formulations has to follow. Informed sources point out that reduction in the ceiling prices of erythromycin tablets could thus be, an obvious error on the part of the department of chemicals and petrochemicals. The matter has been brought to the notice of the department already.

Drug units making erythromycin tablets are stunned by the price cut. Many of them, including Abbott Laboratories, a leading manufacturer of both bulk drug and formulations are likely to be hit by the price reduction, the sources point out.

It is to be recalled that the government had reduced the prices of some other drugs such as rifampicin and ibuprofen a few months ago. The drug units described these price reductions as arbitrary.

In the case of rifampicin, an advanced anti-TB drug, the government had cut the price to Rs. 2,500 a kg from

Rs. 3,000. The price of ibuprofen was cut by half to Rs. 400 a kg from the level of Rs. 810. The sources say that such arbitrary reduction in prices of bulk drugs would make it impossible for the drug units to continue with the formulation production as it lead to losses.

DRILLING FRESH HOPES

The Government will have a clearer picture of the oil and gas the country can hope to get from the five basins, which have been thrown open to foreign oil companies for exploration on production-sharing basis, by the end of the current year or early next year.

According to official sources, the foreign companies are expected to drill the first wells between June and December this year. The results of drilling will be awaited with keenness by the Ministry of Petroleum and Natural Gas. Any new discovery will add to the production in the next decade and will help the country reduce its import bill to that extent.

The companies which have made considerable progress in collecting seismic data were initiated into exploration business in the country following floating of global tenders. Exploration is being carried out under production-sharing contracts with the Union Government and Oil and Natural Gas Commission (ONGC) and Oil India Ltd. (OIL).

In April last year, the Government allocated 59,000 sq. km. of area spread in five basins for exploration to Chevron-Texaco, BHP Petroleum (India) Inc, Shell, International Petroleum (Bermuda) Ltd. and Amoco India. The progress reported by these companies up to January this year reveals that most of them have made considerable headway in the seismic survey and have nearly completed the interpretation and processing of the data they have collected so far. As per terms of the contract, the oil produced in the contracted

block will be made available to the Government at international market price till India attains self sufficiency.

The contract provides for the government to enter into separate agreements with the companies for transfer of technology. ONGC and OIL personnel would be associated with the exploration activities in the contracted blocks to give them exposure to the technology used by the foreign oil companies.

The Government had, in the first round in 1980, offered 32 blocks offshore and 15 onshore -- for exploration by the foreign companies. At that time, one contract for exploration in Saurashtra offshore block had been signed with Chevron. In 1982, in the second round, 50 blocks had been offered -- 42 offshore and 8 onshore. However, no contract could be signed in the second round.

In the third round, 27 offshore blocks were offered in March, 1986 and the Government adopted a flexible approach for the bids to get maximum response. The bidders were given a seismic option allowing them to relinquish an area if the results of survey did not enthuse them to take up exploratory drilling. Bank guarantees and entire commitment were not insisted upon, tax obligations were made easier and contract signature bonus and production bonus paid by contractors was dispensed with.

IDPL INCURS Rs. 30.22 CR. LOSS

The Indian Drugs and Pharmaceuticals Ltd. (IDPL) incurred a net loss of Rs. 30.22 crores in 1987-88. The losses in the two previous years were Rs. 28.21 crores and Rs. 32.21 crores. Industries Minister, Mr. J. Vengala Rao told Lok Sabha in a written reply recently that several steps had been taken to improve the company's performance. During '88-89, the company achieved a production of Rs. 193.3 crores against sales of Rs. 168.2 crores.

No plan to change patents act

The assertion made by the Union Commerce minister, Mr. Dinesh Singh, in the Rajya Sabha on April 27, that the Government had no plan to change the Indian Patents Act, should set at rest all doubts in the minds of industry circles, particularly drug manufacturers, who were apprehensive about a possible change in this act.

Drug manufacturers were earlier upset and deeply disturbed over the reports that the Indian officials had agreed to discuss this issue at the General Agreement on Trade and Tariffs (GATT) talks at Geneva. This doubt arose as the readiness for discussion known was a reversal in its earlier policy. India, with other developing countries, had resisted a forceful demand from developed countries, particularly the U.S. to discuss intellectual property rights such as patents and brand names under the auspices of the GATT. The third world had then argued that the trade related intellectual prop-

erty rights (TRIPS) should be appropriately taken up in forums like World Intellectual Property Organisation (WIPO) or UNCTAD. India's stand was very clear at the GATT's Montreal meeting last year. However, reports came in the first week of April that India had agreed to negotiate substantive norms and standards relating to intellectual property rights under GATT. It was felt that India came under intense foreign pressure and failed to hold on to its old Montreal stand. Meanwhile, ASSOCHAM was reported to have recommended to sign the Paris Convention. Developed countries, the U.S. particularly, continued to pressurise India to change the patent act.

According to Indian Drug Manufacturers' Association (IDMA), India's accession to the Paris Convention for protection of industrial property would result in special preferences for foreigners to monopolise imports and prevent the development of indigenous industry.

IDMA, in its latest communication to the Prime Minister has pointed out that the late Mrs. Indira Gandhi, was the author of the patent act which ushered in an era of technological revolution in the last two decades in India.

It said the current round of intensive lobbying and pressure on India was its success to emerge as a technical force in short span of time to penetrate the world market.

IDMA said the competitive environment in the Indian pharmaceuticals industry made the prices of drugs here lower by 5 to 10 times compared to anywhere in the world. In the monopolistic west, the consumer pays 10 to 12 times higher for his medicines, it said.

India needs to create a culture of research and technology to prevent the braindrain and to provide opportunities for Indians abroad to come back and involve in local R & D efforts, IDMA emphasised, while making a plea to retain the patent act.

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Allocation of pen-G to be frozen

The government has frozen the allocation of penicillin-G at the last year's level to older units making 6-APA and 7-ADCA, intermediates for ampicillin, amoxycillin and cephalexin, in the new policy which is expected to be announced shortly.

There are 10 older units including units like Max India, Gujarat Lyka, Armour Chemicals which are making 6-APA from penicillin-G. All these units were getting a 33 per cent higher allocation over their previous year's consumption of penicillin-G until last year.

According to informed sources at Bombay, 10 other 6-APA units which had come up last year would however continue to get 33% growth rate in penicillin-G allocation from this year. Another major change in the new penicillin-G policy is that the drug units will have to lift first the quarterly quota of 30% of their penicillin-G require-

ment from either Hindustan Antibiotics Ltd. or Indian Drugs and Pharmaceuticals Ltd. to get the licence for importing the rest of their requirements.

Until last year, the government used to issue advance licences for import on a quarterly basis on the understanding that they fulfil the obligation of lifting the local material. The policy of allowing the drug units to import 70% of their requirements of penicillin-G on the condition that they will lift 30% of their requirements from either HAL or IDPL is in operation for some time.

In the new policy, the government has also directed the drug units operating in the western region to lift their local requirements from HAL while all other units should lift their local penicillin-G from IDPL. A direct outcome of the new allocation policy would be that many big drug units making 6-APA and 7-ADCA would be forced to effect production cuts of both

the intermediates in future. Large-scale production of 6-APA and 7-ADCA commenced only about three years in the country and many of the units are yet to achieve their full capacity. Both the intermediates used to be imported until recently, and as the import of 6-APA is stopped completely now.

The new condition in the policy unless the drug units lift their quarterly quota from HAL or IDPL for being eligible to get import licence would result in production bottlenecks, the sources say.

They say that as getting the import licence and the actual import of penicillin-G take normally a few months, the advance licences have been of great help to the drug units so far. The total demand for penicillin-G in the country in the current year is placed at 1900 million megawatt unit (MMU). Against this, the combined production of both HAL and IDPL is 600 MMU.

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BCPL's all time record in production, sales

public sector Bengal Chemicals and Pharmaceuticals Ltd. (BCPL) has set an all-time high in production and sales of its products during 1988-89. Production totalling at Rs. 17.54 crores against the previous financial year at Rs. 12.7 crores and sales at Rs. 12.4 crores against Rs. 7-88. BCPL is gearing up for higher target in the current financial year at Rs. 26 crores ultimately exceeding the breakeven target of Rs. 30 crores in 1990-91.

Addressing this to newsmen at Calcutta recently, Mr. M.G. Banerjee, Managing Director, said that despite being constrained with many adversities, the company has fared better and is looking for much brighter days ahead. He said the proposed rehabilitation scheme implemented the financial picture of the company would be comfortable. The overall target fulfilment was of the order of 90 per cent.

Mr. Banerjee, has managed to bring down the cash losses to approximately Rs. 2.5 crores from Rs. 5 crores in the previous year despite mounting inflationary expenses, higher wages and severe competition in the market place for all its products namely, industrial chemicals, pharmaceuticals and consumer products like Pheneol and Cantharidin (hair oil), he added.

The company's efforts to reach a break-even level and to justify its long-term commercial viability according to the Managing Director, will depend to a great extent on its ability to implement the planned changes within a short time. The turnover level of Rs. 30 crores is to be achieved in two years to reach that goal. This is a tall order considering the general industrial climate in the State and low level of activity prevailing all round. The active participation and involvement of all employees/officers at all levels/State

Government functionaries to improve productivity, curb indiscipline, weed out wrongful work practices and management's ability as a team to involve employees in organisation building is the need of the day.

The company improved sales of its home products and cosmetics division and sales in drugs and pharmaceuticals division. However, both production and sales of its industrial chemicals division suffered substantial setback due to chronic problems of plant breakdowns, ageing of plants and machinery and thrust given to implement some of the cost effective measures.

Performance was also affected due to chronic problems of liquidity, high cost of employment, non-availability of some of the critical raw and packaging materials, large time gap between supply and release of payments by some of the public institutions, State Health Departments as well as some traders,

resulting in high outstandings. Resistance towards implementation of measures to improve productivity, industrial discipline and age old work cultures have been responsible for the shortfall to some extent, said Mr. Banerjee.

Workers' legitimate demands have been met by signing tripartite settlement on January 18 this year. Leaders of federations of unions have shown their maturity in securing higher wages and benefits to meet aspirations of their constituent members.

They have also shown their concern and committed on significant improvements in production and productivity for continued operations of Bengal Chemicals as a part of the settlement.

The extent to which they can lead their members to fulfil company's aspirations, will determine whether Bengal Chemicals will turn into a viable, dynamic and self-sustaining organisation within a short time.

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Uptrend in essential drugs' production

The trend of increasing production of a large number of essential drugs was maintained during fiscal 1988-89 according to official sources. As a result, a significant increase is expected in the production of antibiotics, chloramphenicol powder/palmitate, ampicillin, doxycycline phosphate, diloxanide furoate, propranolol and methyldopa in the current year.

In some cases, declines in production in the organised sector have been offset by cheaper production by the small-scale sector. Hence, the availability of these drugs in the market has not been adversely affected, sources said.

The production of bulk drugs and formulations (in terms of value) increased from Rs. 345 crores and Rs. 1,660 crores, respectively, in 1982-83 to Rs. 480 crores and Rs. 2,350 crores, respectively, in 1987-88. Their production is estimated to be of the order of Rs. 530 crores and Rs. 2,690 crores, respectively, in 1988-89.

Sources said a perspective plan for 15 years has been drawn up to increase the exports of drugs and pharmaceuticals. Exports of drugs and pharmaceuticals during 1986-87 and 1987-88 had been of the order of Rs. 222.96 crores and Rs. 289.60 crores, respectively.

Total imports of bulk drugs, intermediates, chemical solvents had increased from Rs. 285.94 crores in 1986-87 to Rs. 343.50 crores in 1987-88.

Sources pointed out that during 1987-88, 40 letters of intent were issued, including four issued in favour of FERA companies. Total number of industrial licences issued was 20 including the three issued to FERA companies. During this period, 192 Directorate General of Technical Development (DGTD) registrations and 65 delicensing registrations were granted. The number of foreign collaborations approved during 1988 was 20.

Most of the drug and drug intermediaries, except 6-APA, have come under the purview of delicensing subject to

certain conditions, sources said. Official sources said the proposals for duty rationalisation were incorporated in the 1988-89 budget. The rationalisation had been done taking the implications of the new Drug Price Control Order 1987 into consideration. These changes are:

- * Exemption of excise duty has been granted on patent and proprietary medicines based on Category 1 bulk drugs of DPCO, 1987, and other 26 specified essential bulk drugs.

- * The excise duty on patent and proprietary medicines based on single ingredient bulk drugs, specified in the second schedule of DPCO 1987, had been reduced to 10%. There is no change in the excise duty in respect of other patent and proprietary medicines which continues as 15%.

- * The Category 1 bulk drugs specified in the first schedule of DPCO 1987, are exempted from excise duty whereas excise duty of five per cent has been levied on all other bulk drugs. The customs duty on 235 drug intermediates, used in the production of 112 specified bulk drugs has been reduced from 115 per cent to 90 per cent.

Sources said all these changes had been found to be beneficial. During the year 1988, foreign collaborations for 23 items including penicillin, natural gums, vaccines, amino acids and rifampicin had been approved.

Sources said among the five public sector undertakings in drugs and pharmaceuticals, the achievement of Hindustan Antibiotics Limited has been notable. Its production and sales increased by 94 per cent and 64 per cent, respectively, during the last three years and its turnover was likely to increase further.

The company has started earning profits from 1987-88 whereas earlier it was running at losses. Indian Drugs and Pharmaceuticals Limited (IDPL) and Bengal Chemicals and Pharmaceuticals Limited (BCPL) were showing trends of increasing production and sales and reducing the losses.

RAISING CONVERSION NORMS FOR FORMULATIONS: DCI ORDER YET TO REACH FINAL STAGE

An order issued by the Department of Chemicals and Petrochemicals on February 17 last, raising the conversion norms for the manufacture of drug formulations is yet to reach the Food and Drug Administrations (FDA's) of different states.

One of the clauses of the order says that the drug units can get an extra 10% conversion cost over and above the norms if they have good manufacturing practices (GMP), more than the standards prescribed under the Drug Cosmetics Act, 1940.

For being eligible for this extra conversion cost, the drug units, should obtain a certificate from the drug controller of India (DCI). This certificate will be issued by DCI only after inspection, conducted jointly by inspectors of Central Drug Standards Control Organisation and FDA of respective states.

DCI, after receiving the joint inspection report, may issue a certificate to the manufacturer. The manufacturer should then submit the certificate along with application to the department for of extra conversion cost.

According to informed sources, a few drug companies with good manufacturing practices, have applied for certificates to DCI after the issue of order dated February 17. Only after receipt of the certificates can the units apply for the extra 10% conversion cost.

Waiting for weeks for an action by DCI, the drug units have found to dismay that neither FDAs nor regional offices of DCI have received any instructions regarding the new norms. Orders were issued by DCI to conduct joint inspection of drug companies, sources say that drug companies have set up GMP facilities and investments have been asking for revision of conversion norms and an incentive for companies with G



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JK plans 2 bulk drug projects

J.K. Industries Limited is setting up two projects costing Rs. 25.7 crores for the manufacture of hydrogen peroxide and cephalixin monohydrate and 7-ADCA. The projects will be set up in Gujarat and Uttar Pradesh.

According to official sources, the hydrogen peroxide project, costing Rs. 21.50 crores, will have a 5000 tonnes per annum (tpa) capacity. It will come up at Bharuch in Gujarat. The second project relates to the manufacture of 42 tonnes per annum of cephalixin monohydrate and 36 tpa of 7-ADCA. Expected to cost Rs. 4.20 crores the project will come up in a backward district of Uttar Pradesh.

In the case of the hydrogen peroxide project, the company proposes to raise Rs. 4.30 crores through internal accruals and promoters' contribution, Rs. 1.10 crores through foreign exchange loans and the balance from debentures and financial institutions.

For the cephalixin and 7-ADCA project, the company proposes to raise Rs. 84 lakhs through internal accruals, Rs. 56 lakhs from foreign exchange loans and Rs. 2.80 crores by way of debentures and loans from the financial institutions and banks. In approving the first project, the government noted that

the present installed capacity for the proposed item was 4,200 tpa only. As the numerous projects that were approved in the past had not materialised, primarily due to difficulty in securing technology, there was scope for approving additional capacity. The government, however, felt that the large companies seeking to enter the area must make some export commitment, at least to cover the cost of the import requirements.

Accordingly, the approval has been granted with the condition that the company should export 15 per cent of its annual production for a period of five years, which may be extended for another five years at the discretion of the government. The company is also required to maintain a debt-equity ratio to the permissible level of 2:1.

Similarly, the promoters' holding in excess of 40% of the equity capital will have to be divested within three years from the date of commencement of commercial production. This should be done by an offer of sale at the prevailing market price to the general public. It is also expected to raise 50% of the proposed rupee borrowings through debentures to the public on rights basis.

As regards the cephalixin monohydrate and 7-ADCA project, the com-

pany informed the government that its production would help in import substitution. Further, it said the existing demand for 7-ADCA was placed at 130 tonnes against a production of only 30-40 tpa. Continued imports of 7-ADCA, a value added item, would only act as a drain on the foreign exchange.

The government had earlier rejected the company's proposal as a review of penicillin-G cases was being undertaken. The govt. has now noted that the company's fresh application is not linked to its penicillin-G application. Similarly, the govt. felt that cephalixin was a broad spectrum antibiotic used for treatment of various diseases.

The proposals approved earlier by the government were under implementation and a few companies had started production recently. It had, however, not yet picked up to meet the demand (and imports have been increasing every year).

In the case of 7-ADCA, the argument was that it was an intermediate used in the manufacture of cephalixin. It is currently being manufactured by one or two companies. As cephalixin is a delicensed item, capacity is no constraint in granting fresh approval. Accordingly, the government has cleared the J.K. Industries proposal.

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Drinking water mission: Private sector to set up 128 desalination plants

At least 128 desalination plants are to be set up by the private sector as part of Mr. Sam Pitroda's Technology Mission Programme for providing drinking water to villages.

Drinking water is the first among five technology missions for which the Government has allocated a massive outlay of Rs. 7,000 crores. The other four deal with literacy, immunisation, oilseeds and telecommunications.

The Water Mission will look after 1.5 lakh villages which have no provision for drinking water within a 1.6 km radius. The sites numbering 128 were chosen after identifying problems like brackishness, excess fluoride, worm infestation and the like. They are spread over Rajasthan, Tamil Nadu, Maharashtra, Gujarat, West Bengal, Haryana and Pondicherry.

Seven private parties have been issued letters of intent on the basis of bids submitted in response to a tender. They have been asked to set up plants by October-end, possibly with an eye on the general elections.

The following firms have placed orders for reverse osmosis (RO) membranes which constitute the heart of a desalination plant, accounting for about 30 per cent of the cost.

The number of plants to be set up by each company is given in brackets.

Hindustan Dorr Oliver (11), Doshi & Exchange (20) and Team of Madras (10) have placed orders with Du Pont. Water Exchange India Ltd. (10) and Water Treatment, Ahmedabad (11) are going for membranes made by Hydranautics of the US. Thermax of Pune is implementing 53 projects using Universal Oil Products (UOP) membranes and Chem Water treatment (11) has ordered membranes from Filmtech.

As per the agreement, these firms have to set up plants and operate them for three years. During the period, the Government will reimburse recurring expenses every three months for the water produced and supplied. Though no decision has been announced, water is likely to be distributed free, on the basis of 20 litres per capita every day. This water is meant for drinking and cooking and not for bathing.

Water permeating from a dilute solution to a concentrated one is a natural phenomenon called osmosis. This process can be reversed by applying external pressure on the concentrated solution. Called reverse osmosis, it is now widely applied to produce fresh water from brackish and even sea water. It is also used for effluent treatment in industry and in municipal sewerage systems.

Brackish water is unpotable because of high levels of total dissolved solids (TDS). The World Health Organisation (WHO) has recommended an average of 500 parts per million of TDS for drinking water. In many urban and rural areas in the country, salinity (a generic term for dissolved matter not to be mistaken for salt) exceeds 1500 ppm.

RO membranes are made of cellulose acetate or aramid fibre. Millions of hair-like strands of the fibre, mounted in pipes, reject dissolved solids and allow water to pass through. The Vice-President of a Bombay-based firm, which is setting up plants in South India, said the TDS level in some areas is as high as 30,000 ppm, the same level as that of sea water. In a village he visited recently, water comes once every day, carted from another village about 20 km away. Getting people to operate the plants in interior areas may pose a problem. His company is implementing ten projects at a total cost of Rs. 1.5 crores.

The Centre for Scientific and Industrial Research (CSIR) has asked Gujarat State Fertiliser Company Ltd. (GSFC) to conduct research in developing cellulose acetate and cellulose triacetate blends that match international quality.

GSFC is setting up a 90,000 gallon a day capacity RO plant to treat water up to 30,000 ppm TDS at Jamnagar. CSIR has opined that the performance of this plant is to be studied for design of large-sized desalination plants in the country.

RS. 250 CRORES LOSS DUE TO GAS FLARING

The Oil and Natural Gas Commission continues to sustain grave losses on account of flaring of gas during production and foreign exchange fluctuations, despite its remarkable performance in 1988-89.

Talking to newsmen in Bombay, its Chairman, Col. S.P. Wahi, said both these developments are being viewed with due concern, along with measures to optimise oil consumption in industry, which could provide a way out of the oil crisis.

DHIRUBHAI AMBANI APPOINTED L & T CHIEF

Mr. Dhirubhai Ambani, chairman and managing director of Reliance Industries Ltd. is the new chairman of Larsen and Toubro Ltd. (L & T). At its meeting in Bombay on April 28, the board of directors of L & T accepted the resignation of Mr. N.M. Desai as chairman and member of the board and cleared the appointment of Mr. Ambani.

As expected, the board also appointed Mr. U.V. Rao, a former director of the company, as chief executive. However, Mr. S.R. Subramaniam will continue to be the president and managing director. Mr. M.P. Wagh, a general manager, was appointed a whole time director.



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PORT OF SULPHUR FROM SAUDI

India may have to pay higher price

India stands to lose substantially from dual pricing system adopted by Saudi Arabia for the export of its sulphur. According to the new pricing system, which came into effect from April 1, last, Saudi Arabia is selling its sulphur at lower prices to the countries on the Western side and a higher price is being charged from those on its East.

While the countries on the Western side are being charged Rs. 110 for a tonne of sulphur, the nations on the Eastern side are being charged Rs. 115 for the same quantity of sulphur. India is the only major importer of Saudi sulphur on its East.

India imports around 5 lakh tonnes of sulphur every year. Therefore, India will be paying Rs. 25 lakhs more every year for being on the Eastern side of Saudi Arabia. Saudi Arabia argues that it has to keep the prices for the Western countries low since there it has to compete with Canada. India has no choice but to buy the Saudi sulphur as the freight from Canada makes the cost of sulphur from that country higher.

India imports some quantities of sulphur from Iraq also. But the Iraqi sulphur is of rather low grade restricting its use. For 1989, India has contracted the import of 2 lakh tonnes of sulphur from Iraq. Half of this quantity is

to be imported during the first six months of the year and the other half in the last six months.

According to the contract signed between the Minerals and Metals Trading Corporation (MMTC) and Mushraq State Sulphur Enterprise (MSSE) of Iraq, the latter will import goods and services worth 25% of the value of sulphur during the first half of the year and 35% during the second half. MMTC has already entered into a contract with MSSE for the supply of cables worth Rs. 4 crores. Since all these imports will be by MSSE, MMTC officials are confident that there will be definite addition to India's exports to Iraq.

This was the first contract for sulphur for 1989 in the world and had set the price trend for the year. According to MMTC sources, the price quoted was quite favourable to India. India has been negotiating with Iran also for the import of sulphur. MMTC wants this to be on a 100% counter trade basis.

FERTILISER TARGET FIXED AT 94 LAKH TONNES

The fertilisers production target for the current year has been fixed at 94 lakh tonnes leaving only a marginal deficit to be imported to meet the domestic consumption requirement.

Mr. R. Prabhu, minister of state for fertilisers announced in New Delhi. Inaugurating the cooperative sector Kribhco's third annual management conference at New Delhi, Mr. Prabhu said government's policy on fertilisers would be finalised after examining the recommendations of the various working groups which were looking into production, demand and import aspects.

Various options including expansion of indigenous capacity, imports and setting up capacities in third countries were being examined, he added. The government is "considerably worried" about the burgeoning subsidy on fertilisers, the minister said. "Needless to say, every effort has to be made to bring down the costs of production and marketing", he said. Referring to continuing high stocks of fertilisers with some companies, despite the increased consumption in 1988-89, Mr. Prabhu advised them to take up intensive marketing efforts under the present favourable circumstances. Regarding phosphatic fertilisers, the stocks are sufficient, and adequate imports are planned to meet the future requirements.

Mr. Prabhu complimented the Kribhco's managing director, Dr. K.K.S. Chauhan for achieving a record capacity utilisation of 118% in 1988-89, marketing 16 lakh tonnes of fertilisers as compared to 15.25 lakh tonnes in the previous year and for achieving a net profit of Rs. 126.8 crores.

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AIPMA welcomes excise withdrawal

Shri. Vijay V. Merchant, President, AIPMA has welcomed the withdrawal of notification No. 38/89 of 15% excise on articles of plastics both insulated and non-insulated. In a statement released to the press he has complimented "the practical approach and understanding shown by the Hon'ble Finance Minister and the revenue department which has very objectively assessed the implications of the excise proposed on articles of plastics which would have caused more hardships than gains".

He added "this understanding and appreciation of the problems of the plastics industry by the government should be applauded as a timely gesture and would be viewed as a positive approach of the government in further promoting the small scale sector and helping the plastics industry serve all sectors of the society in India." Mr. Merchant also hoped that in the future too there would be such open exchanges between the government and the plastics industry

with the objective of understanding each others problems so as to help plastics serve the needs of modern India.

REPORT ON PIPED GAS SUPPLY READY

Gas Authority of India Ltd. (GAIL) has completed a preliminary study of a project for distribution of natural gas to domestic, commercial and industrial consumers in Bombay. The company has made a presentation before the petroleum and natural gas secretary, Mr. H.K. Khan, in New Delhi recently, outlining the details of the project to be completed by 2000 AD at a total cost of Rs. 418 crores.

A feasibility report will be submitted by GAIL this month to the Central government and the government of Maharashtra for clearance. GAIL has already tied up with M/s. Solfregaz of France as back-up consultants for preparation

of techno-economic feasibility report (TEF) and project supply. An official release said the release of adequate quantity of Bombay high natural gas distribution to different consumers through underground pipeline network in Bombay had been engaging the attention of the govt. In 1987, the govt. allocated to Maharashtra Govt. 1.5 million cubic metres of natural gas for distribution in Bombay.

IFFCO UNIT'S RECORD OUTPUT

The Phulpur ammonia unit of Indian Farmers' Fertilisers Cooperative (IFFCO) has achieved record production and capacity utilisation. The Unit General Manager, Mr. I.J. Ohri, said recently that the record performance of 1988-89 was achieved in both daily and monthly production. From July 1987 to March 1989, there was 4,44,815 MT urea production with a capacity utilisation of 119.8%.

From April to March 1989, production of urea was 5,89,699 MT with capacity utilisation of 119.13%. Mr. Ohri said. From July 1987 to July 1988, urea production was 2,46,933 MT with capacity utilisation of 90.3%.

STANDARD MARK FOR DICALCIUM PHOSPHATE

Dicalcium phosphate of animal-feed grade has been covered for the 1st time under the certification marks scheme of the Bureau of Indian Standards. According to the scheme, licence to use the standard mark on products is granted to manufacturers who produce goods in conformity to relevant Indian standards. Animal-feed grade dicalcium phosphate is covered under IS:5470-1969. This standard prescribes the requirements and methods of sampling and test for animal feed grade dicalcium phosphate which is an important ingredient used for compounding mineral mixtures for feeding livestock. It is necessary to keep the fluorine level low to prevent it being toxic to livestock.

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Reliefs for woven-sack units likely

The Union Government is seriously considering providing financial assistance to the high density polyethylene (HDPE) sack industry. Inaugurating the national seminar on 'Role of plastic woven sacks in national economy', organised by the All India Flat Tape Manufacturers Association (AIFTMA) in Bangalore on May 3, Mr. M.S. Gill, Union Secretary, Department of Chemicals and Petrochemicals, said that mandatory orders passed by the Centre about two years ago, have affected the woven sack industry.

The problems have to be looked at from various view points as the jute industry should not be allowed to collapse. However, it is only a temporary phenomenon, he said. Mr. Gill suggested that the HDPE sack manufacturers look into the possibilities of diversification and exports.

The State Industries and Commerce Secretary, Mr. B.S. Patil, in his keynote address said that the Government is thinking of providing entry tax and power tax reliefs to the industry to get it out of the present crisis. The Sore Cement Chief Executive, N.L. Hamir Wasia, came down heavily on the mandatory jute control order. Use of jute bags are outdated and resulted in five per cent wastage due to leakage.

Losing the race to PP polymers, the jute industry is likely to further lose its competitive advantage during the current period owing to a tight supply position and marked improvements in the production of PP polymers. According to projections made by the International Jute Organisation (IJO) the global capacities of synthetic units is likely to increase by 50 per cent to 16 million tonnes by 1992, as against 10 million tonnes at present. Besides, in Western Europe alone, at least 12 new plants are scheduled to come into operation by 1991. The US and Japan are expected to increase their installed capacities by 0.2 and 0.34 million tonnes respectively. In a document titled "World jute

situation: A review" IJO said that this sharp rise in production capacities would depress the prevailing high prices of PP unless the demand too kept rising at the present high rate. Moreover, a new PP resin making technology which was expected to become operative in the early nineties, would minimise polymerisation steps resulting in even lower prices of PP. This, IJO felt, would be yet another blow to the jute industry, worldwide.

A rise in the prices of PP polymers against a relative stability in the prices of jute had contributed to the present favourable market conditions for the latter. While the prices of PP, in Western Europe rose by 18 per cent in 1988, those of jute rose by only 3 per cent.

The main reason for this fast rise in the prices of PP polymers was the strong demand which offset the increased productions from capacity expansions. However, things would change once the new installed capacities went on stream.

RPG-LINDE PROJECT: WAITING FOR FINAL CLEARANCE

The Tamil Nadu Government has recently finalised details with RPG Enterprises for the Rs. 1000-crore naphtha-cracker project planned to be set up by the group at Manali in collaboration with Linde of West Germany. Disclosing this in the State Assembly on May 3, the Chief Minister, Mr. M. Karunanidhi said work on the 100 per cent export oriented venture will commence as soon as it gets final clearance from the centre.

The project, a major one to come up in the State, will utilise the surplus naphtha available from the public sector Madras Refineries Ltd., as well as through imports, he said. In a policy note tabled in the Assembly, the Chief Minister also said the State Govt. is evaluating the feasibility of setting up a plant at a cost of Rs. 220 crores to manufacture 1.5 lakh tonnes per annum each of soda ash and ammonium chloride.



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Indo-Dutch trade talks held

Indo-Dutch business discussions on wide ranging issues like two-way trade, joint ventures and Dutch investment in India in specific projects with the buy back arrangements etc., were held in New Delhi on May 3.

The business talks were held under the auspices of the Federation of Indian Chambers of Commerce and Industry (FICCI). The high powered Dutch delegation for the business talks was led by Mrs. Van Rooy, minister of foreign trade of the Netherlands. The Indian side was led by Mr. Kanti Kumar R. Podar, chairman, Indian section, Indo-Netherlands JBC.

According to a FICCI release, the Dutch are keen to have tie-ups with the Indian firms in areas like food processing, bio-technology, agricultural development and other related items. Importantly, they are holding seminars on horticulture in Delhi and Bombay to explain to the Indian side the technical

know-how and capabilities of the Netherlands in this sector. The Indian side discussed the possibilities of joint collaborations with the Indian and Dutch firms with buy back arrangements in alcohols, phenol, phenol-alcohols, and halogenated, sulphonated, nitrated and nitrosated derivatives, synthetic organic dyestuffs, medicinal and pharmaceutical products, leather, cotton fabrics, textile fabrics, pumps including motor and turbo pumps for liquids, telecommunications and sound recording and reproducing apparatus.

According to FICCI, the inadequate volume of trade between the two countries also came up for discussion at the meeting. The Netherlands total trade with India in the first 11 months of 1988 accounts for about 0.3% of the total Dutch trade. India accounted for 0.17% of total Dutch global imports. Over the last six years, Indian imports from the Netherlands have increased whereas India's exports have fluctuated.

As a result, India's trade deficit with Netherlands did increase substantially. Indian exports to the Netherlands for the first 11 months of 1988 stood at 317.2 million compared with DFI 317.2 million in the previous year.

This shows a rise of 5%. Imports from the Netherlands for the first 11 months of 1988 were DFI 707.1 million compared with the imports of DFI 707.1 million during the period of the previous year. This indicates a decline of (-) 1.4%, according to FICCI.

The Dutch investment in India is relatively small. During the 1980 period, of the total approved foreign investment of Rs. 8291.16 million, the Dutch share was only Rs. 124.95 million (1.5%). In 1981, the Dutch investment was Rs. 0.84 million. Steps taken to increase the Dutch investment in India also came up for discussion at the meeting.

GSFC's CAPROLACTUM PROJECT

The foundation stone of the Rs. 100 crore caprolactum expansion project of the Gujarat State Fertilizer Co. (GSFC), a state government undertaking, was laid in Baroda by its director (project), Mr. V.A. Sanghani. Caprolactum production would rise from 20,000 to 50,000 TPA with the commissioning of the project, based on the latest technology backed by expertise of W. R. Miskengo and Miskudh. GSFC release said.

MATHURA REFINERY

Indian Oil's Mathura refinery achieved the highest ever throughput of 6.56 million metric tonnes of crude oil during 1988-89, thereby processing crude oil over 100% of the capacity of 6 million MT for the fifth successive year. Mathura refinery, which started production in 1983, processes both High crude and imported crude oil.

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Enforce pollution curbs: panel

The estimates committee of the Lok Sabha has said that it is imperative for industrial units to comply with emission regulations to control pollution. In its 3rd report on air and water pollution laid in the parliament, the committee urged for urgent steps to expedite the surveys in respect of all industrial units and the compliance of emission regulations by public sector units.

It said that only four out of 16 major petrochemical industries have so far been surveyed for in-depth studies. In respect of cement industries, out of 94 units, as many as 42 still had to comply with consent conditions. The committee urged the ministry of environment and forests to oversee the efficiency of emission treatment plants "zealously and periodically" at an appropriately higher level. The committee chided the ministry of environment and forests for not approaching the state governments on the question of further concessions on sales tax for the purchase of pollution control equipment.

It also asked the ministry to finalise with due promptness the procedures for exemptions of customs and excise duty, under the open general licence (OGL), in consultation with the ministry of commerce so that industrial units could obtain pollution control systems without much difficulty. The committee asked the ministry to pursue vigorously with the states of Arunachal Pradesh, Nagaland and Mizoram in the matter concerning the extension of the provisions of the Water Act in those states so that adequate and timely preventive measures to check the menace of water pollution were also taken by them.

The committee expressed concern over a large number of cases concerning the violations of provisions of Water and Air Acts which were pending in various courts. In the case of the Water Act, the number of pending cases till November 1987 was 1,314 out of 1,602 cases filed. In the case of the Air Act

the number of pending cases was 105 out of a total of 202 filed. The committee called for the constitution of special courts in dealing sternly with violations of Water and Air Pollution Acts. It also urged the government to monitor the progress of the establishment of special courts in all states.

EMISSION CONTROL SYSTEM

A dual scrubber for controlling high emissions associated with the start-up of sulphuric acid plants has been developed by Larsen & Toubro Limited (L & T). During start-up as well as continuous working of the plants SO₂ emissions reach high levels (5,000-50,000 ppm).

L & T's system is designed to eliminate unsteady state of emissions due to fluctuations in operating conditions and restore steady emissions at a low level of less than 100 ppm which is within the permissible limits specified by various pollution control authorities. L & T's dual scrubber system mainly comprises a venturi and pack column, has advantages of handling varying concentrations of SO₂ normally encountered during start-up. The system has been successfully tested in operating sulphuric acid plants. The clog-free design can be easily incorporated in existing plants and practically needs no maintenance.

SAFETY SYSTEM FOR OIL RIGS

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Call to hasten moves to cut CFC output

Representatives from 86 countries met on May 2, to discuss a total ban on the global production of CFCs, the gases blamed for depleting the ozone layer that protects the earth from the sun's ultraviolet radiation.

A draft resolution drawn up by Finland proposed speeding up the timetable adopted in the 1987 Montreal protocol, which requires industrial nations to cut production of chlorofluorocarbons to half the 1986 levels by 1999.

The declaration will also call for help to developing countries in finding and financing alternatives to CFCs used in refrigeration, cleaning, aerosol cans and other industrial products.

Scientists say the destruction of the ozone layer is causing increases of skin cancer, eye damage and is potentially dangerous for the world's natural food chain.

The draft sought acceleration of development projects to find safe CFC substitutes, and called for "funding mechanisms" to replace environmentally dangerous equipment in Third World nations.

Industrial nations must spend much more on new technologies and be prepared to transfer applicable technologies

and know-how to developing countries, the Finnish President, Mr. Mauno Koivisto, said in the opening speech of the conference.

The annual production of CFCs is 1.14 million tonnes, of which the US and western Europe produce two-thirds. The Soviet Union's estimated production is 10% and Japan produces 12% of all CFCs.

Meanwhile, the Dutch Prime Minister Ruud Lubbers announced that his coalition government would resign on May 3, after liberal partners refused to back a multibillion-dollar anti-pollution scheme.

Mr. Lubbers, who was speaking in parliament, came to power in 1982 at the head of a Christian-Democrat and Liberal coalition, and was re-elected in 1986.

AMERICAN AWARD FOR UGC CHIEF YASH PAL

Prof. Yash Pal, chairman of the University Grants Commission has been chosen for the annual award of the Association of Space Explorers of the United States, in recognition of his work in bringing the benefits of space to mankind.

The award will be presented to him at the fifth annual planetary Congress of the Association of the Space Explorers to be held from November 10 to 15 in Riyadh, Saudi Arabia.

An international professional organisation of astronauts and cosmonauts from 17 countries and founded in 1969, the ASE confers awards on an individual who has exemplified in his professional life the particular theme of the congress. This year's theme is 'space for earth'.

The past award winners and the congress themes they embodied were Jacques Yves Cousteau (the home planet), Dr. Oleg Gazenko and Dr. Gerasim O'Neill (towards space civilization), Dr. Thomas O. Paine (the next generation in space), and Prof. Boris Rauchenbaker (space evolution).

A distinguished space scientist, Prof. Yash Pal was the first director of the Space Applications Centre, Ahmedabad. He was also instrumental in developing the technology and elements of the satellite instructional television programme including SITE.

He was the first chairman of the INSAT board. He also developed proposals for orbiting satellites to be used for communication purposes by developing countries.

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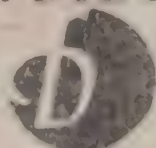
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Reduced aid to petroleum sector

The petroleum industry will be receiving substantially reduced assistance from the Oil Industry Development Board (OIDB) during the current financial year. Against Rs. 368 crores in 1988-89, the assistance from OIDB would be Rs. 239 crores in 1989-90.

This, however, does not mean that the petroleum sector would be starved of funds. Its internal resource generation of Rs. 2,999.76 crores will be substantial enough to meet the entire plan outlay of Rs. 3,448 crores with a modest budgetary support of Rs. 175 crores. But the decline in OIDB assistance does indicate that the government would be tapping larger amounts of revenue from the oil sector to meet its other expenses during the current year. This would be in addition to the transfer of Rs. 2,300 crores from the oil pool account.

OIDB was set up in 1975 to render financial and other assistance for the promotion and development of the oil industry in all its facets. The funds required for this purpose are released by the Centre (after due appropriation by Parliament) from the proceeds of the cess levied on indigenous crude oil and credited with OIDB. The present rate of cess is Rs. 600 per tonne. No cess is levied on natural gas, although there is provision under the law.

According to the government's own estimates, the petroleum sector's contribution of cess to the Central exchequer during 1989-90 would be Rs. 2,202 crores compared to Rs. 1,882 crores in 1988-89. The cess payment to the Centre during 1987-88 was estimated at Rs. 1,771 crores. Against such huge collections from oil cess, the Centre provided only Rs. 63 crores to OIDB during 1988-89.

During 1989-90, the Centre has projected a contribution of only Rs. 100 crores from out of this cess collection to OIDB. This clearly shows that the government would be using larger

amounts from the cess collections to meet its other expenditure, experts say.

From OIDB's point of view, its own resources would also show a rise during the current year as a result of its reduced contribution to the petroleum sector. The availability of funds at the disposal of OIDB (including its opening balance and internal resources) during 1988-89 amounted to Rs. 690 crores. Of this, a sum of Rs. 368 crores was contributed to various organisations during 1988-89 as assistance.

These included Gas Authority of India Ltd. (GAIL) (Rs. 246 crores), IBP (Rs. 9.66 crores), Cochin Refineries (Rs. 41.12 crores), Madras Refineries (Rs. 30 crores), Balmer Lawrie (Rs. 6 crores) boiler replacement at IOC, BPCL, HPCL (Rs. 2 crores) and conversion of bulk bitumen (Rs. 6 crores). After deducting Rs. 368 crores from Rs. 690 crores, OIDB was left with

Rs. 322 crores. At the beginning of 1989-90, OIDB had a total sum of Rs. 485 crores (Rs. 322 crores added with Rs. 63 crores and Rs. 100 crores of budgetary contribution in 1988-89 and 1989-90 respectively). If OIDB disburses its total assistance of Rs. 239 crores during the current year, it would be left with Rs. 246 crores only by the end of 1989-90.

The assistance proposed to be provided by OIDB during the current year is Rs. 78.74 crores to GAIL, Rs. 55.21 crores for various schemes under the petroleum ministry's supervision, Rs. 20 crores to MRL, Rs. 26.4 crores to Cochin Refineries (for its refinery project), Rs. 1.47 crores to Lubrizol India, Rs. 0.5 crores to Bongaigaon refineries, Rs. 7 crores to Cochin refineries (for its petrochemical project), Rs. 17.22 crores to IBP Company and Rs. 9.97 crores for Balmer Lawrie. This assistance is provided to help the companies meet their plan investments and other programmes.

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IMPORT-INTENSIVE PROJECTS

Clearance may be postponed

The Union government is likely to postpone the clearance and implementation of major import-intensive projects by a year or two, so that the growth in imports during the coming years can be contained within a manageable level.

The government is also exploring possibilities of restricting imports of raw materials, components and equipment by large industrial houses by stipulating that they may go in for such imports only against replenishment (Rep) licences obtained either through their own exports or purchased from other exporters at a premium.

According to highly placed government officials, these two measures are among the steps being contemplated by the Centre to significantly decelerate the growth rate of imports during 1989-90, if not completely curb it. The government is quite concerned at the import

growth rate of about 32 per cent during the last year against an export growth rate of 27 per cent.

It is felt that steps must be taken to bring down the import growth rate at least by 5-7 per cent so that the rate of increase in imports matches that of exports. Policy-makers are considering this as imperative as they feel that even allowing imports growth to outstrip exports by five per cent, as it happened in 1988-89, can be disastrous for the economy.

Interministerial discussions are being held in the light of such a perception of the economy. The consensus during these talks so far is that incentives for exports should be continued as they are yielding results in the form of higher exports. But serious attention will have to be paid towards import planning. The trade gap widened to Rs. 8,000 crores

in 1988-89 compared to Rs. 6,600 crores in the previous year. During these discussions, policy-makers are favouring a deliberate policy to delay clearance of new projects, which would entail substantial foreign exchange outgo at the time of their commissioning. For instance, petrochemicals and fertiliser projects, which cause foreign exchange outgo on import of capital equipment, can be delayed by a year or two.

An analysis has shown that postponement of clearance and implementation of import-intensive projects in the field of petrochemicals and fertilisers would adversely affect the country's import substitution efforts in this area only to a limited extent. For instance, the foreign exchange outgo on import of ethylene (produced by the petrochemical complex) and fertiliser may be far less than the outgo on putting up such projects at this time.

It is argued that these projects could be taken up later when the balance of payments situation improves and imports can be allowed to grow at a higher rate than now. Official sources say even some automobile industry projects could be delayed to contain imports during the current and following years.

The second step being contemplated envisages that large houses be allowed to import their raw materials and components only when they earn foreign exchange equivalent to a given percentage of their total imports. The Rep licence policy may also have to be modified to make this possible.

The government may have to allow sale of Rep licences by exporters at a premium. The big houses keen on imports must do so by purchasing these licences. In other words, the units can import only if they encourage an exporter to earn more foreign exchange and get more Rep licences. The encouragement can be given only if Rep licences are allowed to be sold at a premium.

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PETROLEUM PRODUCTS

Curb on consumption likely

The government is determined to curb consumption of petroleum products in view of the adverse balance of payments. Some restrictions on distribution may even be imposed, in case overall import growth is not contained in the next few months.

Currently, imports are growing at the rate of about 27 per cent annually. Official sources say the growth rate will have to be reduced to about 18 or 19 per cent in 1989-90, in order to significantly improve the balance of payments position. A review of trade data will be carried out in July to study the impact of recent duty changes and exchange rate fluctuations on import growth. In case these have not led to a slowing down of imports, by then, more steps will be taken in this direction.

The focus will be on the oil sector since the import bill is likely to touch Rs. 5,000 crores this year as against Rs. 4,200 crores in 1988-89. The finance ministry is naturally concerned over the heavy drain on foreign exchange reserves in this sector and feels consumption will have to be restrained. But oil industry circles maintain that the growth rate in petroleum products consumption is seven per cent annually in India, which is considered a relatively low level for a developing country.

The main reason for the growing cost of oil imports, they say, is the recent firming up of international prices. Besides, the country's self-sufficiency in oil has gradually declined from 75 per cent to 65 per cent over the last five years. The finance ministry, on the other hand, thinks that demand for petroleum products will have to be contained to some extent this year to tide over the difficult balance of payments position.

In fact, senior officials say a more conservative approach will have to be

adopted to the entire spectrum of imports in order to keep the trade deficit at manageable levels. Latest estimates are that the deficit has reached Rs. 8,000 crores in 1988-89 as against Rs. 6,600 crores in the previous year.

Projections for the current year indicate that the deficit may reach Rs. 11,000 crores unless brakes are applied on runaway imports. Some steps have already been taken in the budget to alter the duty structure, while several items especially in the automobile and electronic sectors have been shifted to the restricted list from Open General Licence (OGL).

A comprehensive review of the OGL list is also likely to be taken up soon to eliminate non-essential items. Fortunately, officials point out, several unusual factors which led to the deterioration in the balance of payments last year, will not operate this year.

Petrochemical imports will ease by the middle of this year, with the commissioning of the Maharashtra gas cracker. Petrochemical imports were in the region of Rs. 1,000 crores last year, on account of a phenomenal spurt in demand. Besides, it is felt, there was a tendency to build up import-related inventories last year owing to expectations that the liberal import policy may not continue for too long.

INDO-U.S. OIL EQUIPMENT VENTURES MOOTED

Petroleum secretary Mr. H.K. Khan has mooted the idea of Indo-U.S. joint ventures in manufacturing oil-field equipment to prevent draining valuable foreign exchange. At a luncheon meeting of the Indo-American Chamber of Commerce on "Oil/gas today and the emerging scene" at New Delhi on May 1, Mr. Khan said this was a crucial area on which the success of India's oil pro-

duction depended. The country's requirement covers a wide range of equipment like rigs, platforms, offshore vessels, he said adding, even today the country was paying heavy sums in foreign exchange for such equipment and government would like to encourage joint-ventures. He said the foreign exchange involved in the import of oil-field equipment was over Rs. 5,800 crores. Mr. Khan said production could be indigenised in a phased manner. The techniques of enhanced oil-recovery as well as early production systems also throw up the need for a number of chemicals which offer scope for setting up industries in this country.

The United States has been one of the pioneers in the field of oil production which is one area where India and U.S.-based companies can work together fruitfully, he said. Talking about efforts to boost crude oil production, he said, we have tried to enhance our targets for the Eighth Plan and we now expect to reach a level of almost 50 million tonnes of oil by 1994-95. The petroleum secretary referred to refining capacity and said if one had to plan for 85 per cent of self-sufficiency in refining by 1994-95 "we shall have to think of increasing our refining capacity by nearly 18 million tonnes within the next five years".

This will have to be achieved by setting up new refineries as well as enhancing the capacity of existing refineries, he said, adding that the government had initiated action for setting up new refineries in Karnal and Assam. "We are studying the prospects of a refinery in Mangalore" he said, pointing out that new refining capacities would have to be planned in other areas of the country also.

Earlier, Mr. Kisan Mehta, regional president of the Northern India chapter of the chamber, said India had to become self-sufficient in oil production to conserve foreign exchange now used on imports.

SUPPLIES TO PASS BOOK LICENCE HOLDERS

Deemed export status granted

Supplies made to import-export pass book licence holders will be treated as deemed exports for import replenishment benefits as in the case of advance licence holders. Moreover, a manufacturer-exporter holding a pass book licence will also have an option to obtain supplies of some items from intermediate suppliers.

A public notice issued by the chief controller of imports and exports on April 26 has put pass book licence holders almost on a par with those having advance licences. Therefore, amendments have been made, both in the Import-Export Policy (Volume I) and the Hand Book of Procedures, 1988-91.

For the purpose of deemed export benefits, supplies made in India of intermediate products to pass book licence holders will now be eligible.

Under the duty exemption scheme, a para has been added after the end of the existing para 220(2) of the policy

(Volume I) which reads: The facility of this scheme will also be available where the ultimate manufacturer-exporter is an import-export pass book licence holder.

Under the duty exemption scheme, a new paragraph has been added after the existing para 238 in Chapter XIX. The new para reads: This provision will, however, not be applicable in case of supplies to be made by an intermediate manufacturer to the ultimate exporter under the intermediate advance licensing scheme covered under the provision of para 220(2). In such cases, supplies by the intermediate manufacturer to the ultimate exporter can take place only after the advance licence or the import-export pass book licence is issued in favour of the ultimate manufacturer and the requisite bond or legal undertaking, as the case may be, is executed by him. In Chapter XX relating to pass book scheme, a new para has been added after para 269 relating to supplies under the

intermediate advance licensing scheme. The new para is: A manufacturer-exporter holding an import-export pass book licence under this scheme will also have an option to obtain supplies of one or more items upto the quantity and value specified in the pass book licence from an intermediate manufacturer in terms of provision contained in para 220(2) of the import policy. In that case, the procedure laid down in para 35(1) of the Hand Book of Procedures will be followed. In the Hand Book of Procedures under the duty exemption scheme, the first sentence of para 353(1) of Chapter XIX has been substituted by: Before clearance of the first consignment for import against a licence issued under the duty exemption scheme or for obtaining supplies from the intermediate manufacturers under the intermediate advance licensing scheme, as the case may be, the licence holder shall be required to execute a bond with the requisite value of bank guarantee or legal undertaking as the case may be, with the concerned licensing authority in the prescribed form given in Appendix XIX-F and XIX-I of the hand book for fulfilment of the export obligation imposed.

In chapter XX-import export book scheme, the first sentence of para 386(1) has been similarly substituted (as in the case of duty exemption scheme). The public notice stated that the amendments have been made in public interest.

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AMERICAN SAFETY AWARD FOR GSFC

The Gujarat State Fertilizer Company has for the fourth year in succession bagged the prestigious safety award of the National Safety Council of America for its performance during the year 1988-89. Congratulating the management and employees of the GSFC, the president of the National Safety Council of America, Mr. I. Gilchrest said the company had been given the award for its operation for over 43 lakh employee hours without any occupational injury or illness, involving days away from work or death, for the period of October 1988 to March 1989.

CAG highlights lapses in heavy water unit

The comptroller and auditor-general of India (CAG), in its report submitted to the government of India, has found several irregularities in the commissioning and running of the Baroda heavy water plant of the department of atomic energy.

There was a 53-month delay in commissioning of the plant, large cost overruns, an increase in the cost of production and high running costs.

The foreign collaborator, too, who was not to have given performance guarantees, was absolved of all contractual obligations although the plant faced equipment failure, delays in equipment supply, a major fire and an explosion. In addition, no performance accounts have been prepared for the last eight years.

The Baroda plant was set up in technical collaboration with M/s. Gelpra of France and an agreement was entered into with them in 1969 to commission the plant in 1973. The plant, however, was commissioned only in June 1977, closed down to a fire and was restarted in January 1980.

The plant was to produce heavy water at an estimated cost of Rs. 478 per kg. Later, the cost was revised to Rs. 1,023 per kg and the CAG found that in 1986-87, the cost of production was in excess of Rs. 6,886 per kg. Such was the planning and management of the DAE that the cost of production per unit increased by over 100 per cent over its initial estimate.

The CAG found that of the 53 months delay in commissioning, 22 months were accounted for by delays in supply of equipment and two months by consequential delay in erection. The other five months were lost due to equipment failures and 24 months were lost in commissioning.

The initial financial sanction of Rs. 1,508.7 lakhs in 1973 went up because of slippages to Rs. 3,387.15

lakhs by June 1980. The CAG found that in five out of the ten heads of expenditure, the cost over-run was over 50 per cent.

The story of how the foreign collaboration was handled is no less interesting. Nineteen amendments were issued to the technical collaboration agreement and in the process, the financial liability of the DAE increased by French francs 38.41 lakhs, while the warranty period of the equipment supplied by the French firm was reduced. The DAE provided no reasons for either increasing the cost of supervision, to be paid to the French firm by more than 100 per cent or reducing the initial guaranteed production from 95 per cent to 93 per cent, or even for reducing the mechanical warranty period in the contract with Gelpra when it was provided to last for a longer period of time.

The DAE failed to explain why Gelpra was absolved of equipment warranty even though various equipment failures were noticed during mechanical testing and even afterwards. The DAE told the CAG that the continued stay of Gelpra experts would have been at its cost. However, the CAG notes in its report that the need for the French experts arose out of the failure of Gelpra to supply the equipment on time and also because of equipment failure. "Being so, Gelpra experts should have been asked to stay at their own cost to prove the plant", it notes.

The CAG has noted that the cost of production of heavy water at Baroda is high not only because of the more than doubling of the project investment cost, but also because the average production at the plant is less than 30 per cent of capacity.

Besides these, the CAG has also taken note of some other failures of the plant management. These relate to the delay in payment of fixed charges and payment of dues for ammonia bought

from the Gujarat State Fertiliser Company, extra expenditure on natural gas, extra expenditure on insurance and overpayment to transport contractors.

PAC RAPS DOE ON NATIONAL SILICON FACILITY

The Public Accounts Committee (PAC) has pulled up the department of electronics (DoE) for adamantly going ahead with the setting up of the national silicon facility with Hemlock collaboration at a cost of Rs. 88.75 crores, though the project was subsequently abandoned in the face of stiff opposition from department of non-conventional energy sources (DNES) and eminent scientists.

In its 158th report on National Silicon Valley, laid in Parliament on April 28, the committee said while the task force had assessed the total demand for polysilicon in 1990 at 100 tonnes per annum, the negotiating committee after 18 months computed it at 230 tonnes per annum. Of this, more than 80 per cent was for terrestrial solar cells, a subject handled in respect of non-conventional energy sources and demand of higher grade of semiconductors handled by DoE was much smaller and was likely to remain at low level in the foreseeable future, it said.

The committee said that against assessment of national demand for silicon at 230 tonnes per annum in 1990, the actual demand today works out in the region of 57 tonnes. The present demand is thus nowhere near the projections made by the task force and negotiating committee, it said.

The report said that the DNES had advised the DoE to build up the national silicon facility gradually through modular approach and cost-effective manner as the demand for photovoltaic was budget-constrained and price-sensitive and efforts were on to reduce the price drastically during the next few years.

KANDLA-BHATINDA PIPELINE

Five foreign firms submit bids

The race for the prestigious consultancy contract for the Kandla-Bhatinda pipeline project has begun with as many as five international giants putting in strong bids for the job. The companies in the fray are British Gas, Bechtel of the UK, P.L. Engineering of West Germany, PL Technology of the UK and Nova Corporation of Canada. Some more bids are believed to have come, but their details are not yet known.

The process of evaluating these bids has been expedited as only in the third week of April the pipeline project obtained the environmental clearance from the ministry of environment and forest. The ministry has agreed to the project's plan for compensatory afforestation, i.e., creating forests lost on account of the laying of the pipeline.

Once the consultants for the project are selected, the next stage of bidding for the actual execution would start. But the first stage of selecting consultants is crucial for executing the project. This is because the companies that will supply the equipment and lay the pipeline would have to function within the broad design parameters of the consultants. According to official sources, the project will most probably be executed by a consortium of companies. Each

member of the consortium takes care of some portion of the project under the general supervision of the consultants. Credit packages for the part of the project implemented by each of these consortium members are also expected. This would be in addition to the World Bank loan of about \$130 million for the pipeline project.

The credit packages by the consortium members and the World Bank loan would be more than adequate to meet the foreign exchange cost of the project estimated at Rs. 223 crores at March 1988 prices. Obviously, the foreign exchange component would have gone up since then.

The total cost of the pipeline project would also have gone up from Rs. 687 crores estimated at that time. The project, to be implemented by the state owned Indian Oil Corporation (IOC), obtained the final stage clearance from Public Investment Board (PIB) in the last week of January. It is now before the Cabinet awaiting the clearance by its committee on economic affairs. The total length of the pipeline would be about 1,330 kilometres with an estimated capacity of carrying three million tonnes of petroleum products per annum on the Kandla-Karnal section and 1.5

million tonnes of products per annum on the Kandla-Bhatinda section. The pipeline would be the longest production pipeline in the country and the second longest pipeline for either gas or products after the HBJ pipeline, which has a length of 1700 kilometres.

The project, which is scheduled to be completed in 33 months from the date of final approval by the Cabinet, will have some tap-off points, from which products could be drawn for transportation to other destinations. The capacity of the pipeline can also be expanded as and when the need arises. The design of the pipeline is being prepared keeping this in mind. The first stage clearance to the project was given about a year back. Subsequently, IOC was asked to prepare the detailed feasibility report. The report was considered by PIB in December 1988, but some additional details were sought by the board. This was furnished at the next meeting in January 1989, subsequent to which the second and final stage clearance was given.

Following this, IOC invited bids for the consultancy contract. Significant Engineers India Ltd. has not been invited for this work. Also this is for the first time that IOC is going in for foreign consultancy. All its previous projects, including those for laying pipelines, had in-house consultants of IOC.

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Haldia refinery poised for massive modernisation

The Rs. 83.5-crore Haldia refinery, commissioned on the banks of the river Hooghly in Midnapore district in 1975, is now poised for massive modernisation. Projects valued at Rs. 20 crores are under execution, besides completion of some others at a cost of Rs. 10.82 crores as demand for petroleum products are on the rise.

Disclosing this to a visiting group of businessmen the general manager, Mr. H.J. Dave said that the revamping of the lube oil block at a cost of Rs. 26.5 crores was the card to increase the production of lube oil base stocks from 1.49 lakh tonnes to 2.22 lakh tonnes.

Haldia is one of the three refineries in India producing high quality grade lube oil base stocks, besides other products. The LPG cylinder filling plant with a capacity of 6,500 cylinders per day will be modernised soon at an estimated cost of Rs. 2.75 crores.

The ongoing projects of the refinery include extension of tank wagon loading gantry for augmenting the wagon loading capacity, pipelines for the proposed second oil jetty, augmentation of LPG cylinder storage, revamping of the solvent dewaxing unit for increasing the production of lube oil base stocks to a total of 1.62 lakh tonnes.

The refinery already completed a number of projects like installation of pre-heaters in crude distillation unit, vacuum distillation unit for energy conservation, de-bottlenecking of effluent treatment plant for improving quality of effluent to minimum national standard (MINAS), water sprinkler system in LPG area, and new tanks for storage of products.

Mr. Dave said the refinery processed 10 million tonnes of crude oil, mostly imported from Basrah in 1988-89, by achieving 103 per cent capacity

utilisation. This is the fourth year, the refinery attained more than 100 per cent capacity utilisation.

This achievement in the processing of crude oil was due to consistent technological improvements, close monitoring of plant operation and effective maintenance and harmonious employee-employer relations.

The general manager said that the fuel and loss percentage had been brought down to 8.3 per cent due to operational efficiency, besides saving of Rs. 4 crores foreign exchange due to saving of fuel to the tune of 27,000 tonnes.

Highlighting the other areas of performance, Mr. Dave said the refinery achieved the highest ever production of high speed diesel (8.98 lakh tonnes), bitumen (2.28 lakh tonnes), carbon black feed stock (83,000 tonnes), slack wax (4.7 thousand tonnes) and transformer oil feed stock (5,000 tonnes).

All time records were also set up by the refinery in regard to HSD despatches (8.92 lakh tonnes), bitumen (2.24 lakh tonnes), carbon black feed stock (83,600 tonnes), slack wax (3,000 tonnes) and lube oil base stocks (1.49 lakh tonnes).

A special grade aviation fuel for the first time in the country was produced in collaboration with Soviet experts, he said and added "we can meet the requirement of oil for sophisticated aircraft". Replying to questions, Mr. Dave said at present there was no plan for expansion of the refinery because of resource crunch.

He said the fire incident in June last year was caused by volatile products resulting in the death of two workers and added corrective measures had since been undertaken by the authority.

OIL STRIKES GAS AT JAI-SALMER BASIN

Oil India Limited (OIL) has struck a major gas field in the Tanot structure in the Jaisalmer basin of Rajasthan. According to the information reaching at the OIL office at New Delhi, the geological reserves of the gas discovered at Tanot are put at over two billion cubic metres.

Preliminary estimates suggest that the Tanot structure will produce natural gas at the rate of two lakh cubic metres per day (sufficient to sustain power generation by a 50 MW plant). Availability of this pollution-free fuel will be a boon to the power-starved Rajasthan which is devoid of coal or hydel resources. Encouraged by results, OIL has decided to charter hire two rigs for Rajasthan -- one medium duty and the other light duty. The foreign exchange component of the project is being funded by a World Bank loan. The tentative allocation for the project is \$25 million.

The total cost of survey phase of Rajasthan project including seismic survey using the Vibroseis technique, setting up a computer centre in Jodhpur for data processing, and interpretation by three groups of reputed geoscientists is Rs. 31 crores. The sanction for the drilling phase is about Rs. 51 crores which will be utilised during the Seventh Plan.

An encouraging sign from Tanot Well No. 2 is that a minor quantity of crude oil has also been obtained from a deeper sand of middle cretaceous age. OIL's second exploratory well was drilled at Ramgarh at a distance about 85 kms from Tanot Well No. 1. Ramgarh Well No. 1 was spudded on August 26 last year. The final depth reached was 2963 metres. The Ramgarh wells have good prospects at a shallow depth ranging from 145 metres to 475 metres. The gas has over 60% hydrocarbon content. A number of shallow wells are planned to be drilled to assess the hydrocarbon potential of this area.

Panel to study Gulf petrochem proposals

The Union government has set up a high-level group to study the various proposals that have been received from the Gulf countries for setting up petrochemical projects with Indian collaboration. The committee will comprise members from the Indian Petrochemicals Corporation Ltd. (IPCL), Engineers India Limited (EIL) and the Planning Commission. It is learnt that the group will examine the proposals for collaboration that have been received from Saudi Arabia, Bahrain, Qatar, Kuwait and even Algeria for that matter.

A decision to this effect was taken at New Delhi recently during an inter-departmental meeting between allied agencies. The group, among other things, will study the viability of the proposals, investment required and the extent to which Indian participation can be possible. Its report is expected to be finalised within four weeks.

The official thinking is that in addition to collaborating with the countries

in West Asia in the petrochemical sector, the possibility of tapping the world market for the end products too should be explored. Admittedly, the joint ventures with Saudi Arabia, Qatar and Bahrain will help in meeting, substantially, the demand for petrochemical products in the country. At the same time, the thinking now appears to be to see if India can set up ventures to sell the products to different markets.

The joint ventures for exports, incidentally, need not be confined to a few countries. For example, India could tap Algeria where it plans to set up a petrochemical complex. This complex is expected to have a gas cracker as the mother unit and will use the surplus feedstock available in that country.

Recently, a high-level Indian team had visited Saudi Arabia, Bahrain and Qatar to explore the possibility of setting up joint units in these countries. In its report the committee had highlighted the scope for joining hands with petro-

chemical units in these countries as main feedstock, namely, gas is in abundance there.

PANEL SUGGESTS RS. 15,000- INVESTMENTS IN PETROCHEMICALS

It is reliably learnt that the Abid H. sain Committee has recommended a new investment of Rs. 15,000 crore in the petrochemical industry during the Eighth Plan, said Mr. B.S. Patil, secretary, Karnataka ministry of industry and commerce. He was addressing a promotional meeting on Plastindia organised by the Plastindia Foundation at Bangalore on April 26.

Plastindia '90 an International Plastics Exhibition and Conference, will be held at the Pragati Maidan, N. Delhi during the first week of March 1990. The main objective of the Plastindia '90 is to familiarise the Indian Plastic processing industry with the latest developments in technology and new products in the industrialised world and to secure export for the Indian-made plastics, said Dr. M. Dhuldhoya, chairman of national executives council, Plastindia '90.

Dr. Dhuldhoya informed that the Plastindia '90 would be organised in association with NOWEA International of Federal Republic of Germany. The exhibition would cover an area of 19,000 square metres. Out of it, about 3,000 sq. m. area would be allotted for the international participant units.

Dr. Dhuldhoya also informed that a few Indian delegations would be sent to the Plastindia Foundation to help the Indian industrialists understand the latest developments in the field of plastics and benefits from them. The uses of plastics in India are as diverse as the range is wide. There is a large variety of plastics, both thermoplastics and thermoset. The major thermoplastics are LDPE, LLDPE, HDPE, PP, PVC, PS. The thermoplastics of special interest are phenolics, UF, epoxy and unsaturated polyesters. Besides these, there is an increasing demand for a large variety of engineering plastics.

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AURIYA GAS CRACKER COMPLEX

Site selection committee set up

The govt. has set up an eight-member selection committee for the proposed Auriya gas cracker complex. The committee will be chaired by Mr. R. Ramani, former director, Indian Petroleum Corporation Ltd. (IPCL). IPCL has already submitted an application for the issue of a letter of intent for setting up the Auriya cracker complex at an estimated cost of Rs. 2,250 crores. The foreign exchange component in this will come to Rs. 500 crores. The secretariat of Industrial Development (SID) which considered the application, however, feels that before a decision can be issued it would be appropriate to take a decision on the investment. In this connection, a meeting was held recently by the Department of Chemicals and Petrochemicals to discuss the product pattern and financing of the project. IPCL has now been asked to furnish the required information. In the meanwhile, the government felt it would be appropriate to select a suitable site for the project. Accordingly, the committee has been constituted. It will undertake the exercise keeping in mind the project requirements, environmental and safety aspects and the feedstock linkage. The members of the committee will comprise representatives from the Department of Chemicals and Petrochemicals, Engineers India Ltd. (EIL), Maharashtra government, Department of Environment, Directorate General of Technical Development (DGTD) and GAIL. A representative of the Gas Authority of India Ltd. (GAIL) will also be on the committee. The Auriya project has been in the pipeline for some time in view of the fact that both IPCL and GAIL have made plans for it. IPCL, incidentally, is setting up the Nagothane gas cracker project in Maharashtra -- scheduled to be commissioned by the end of this year -- will also be the first gas cracker in the country. The Gas Authority of India too has thrown its hat in the ring. At an

interministerial meeting, according to reports, the decision appears to have gone in favour of allowing both the contenders to execute the project jointly. Of course, decisions about which of the two will be the majority partner have not been taken.

Whatever be the final outcome, it is now certain that the government will opt for the Auriya gas cracker in the Eighth Plan even though a host of other states have also bid for a similar project. Indications available from official sources are that in the Eighth Plan there will be two gas crackers in the public sector, the other being set up by IPCL at Baroda as part of its expansion and modernisation plan. In fact, the Baroda cracker will have a dual feedstock -- naphtha and gas. The government has already approved a cracker at Hazira in Gujarat, to be set up by Reliance Industries.

Even though the Abid Hussain committee, which went into the require-

ments of petrochemical units in the Eighth Plan, has not made its report public, it is now quite certain that there is no room for another gas cracker, officials at New Delhi explain. There is, however, scope for setting up another naphtha cracker probably in the south, for which various bids have been received from a host of private sector companies.

In all the government is envisaging an investment of about Rs. 10,000 crores during the Eighth Plan in the petrochemical sector. The current thinking is in favour of setting up three olefin and two aromatic complexes along with three plants for producing linear alkyl benzene (LAB). This would roughly involve an investment of about Rs. 8,000 crores with the olefin complexes alone accounting for Rs. 5,500 crores.

Other investments are being planned for modernisation and expansion of existing capacity along with the setting up of synthetic fibres, synthetic rubber and engineering units.

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New Assam refinery to be IOC subsidiary

The vexed issue of setting up a refinery with an installed capacity of two million tonnes per annum in Assam, which has been burning fire for the last four years seems to have been resolved. The State Government and the Centre have agreed to set up this refinery as subsidiary of Indian Oil Corporation (IOC).

According to informed sources, the issue was broken following a recent meeting of the State Chief Minister with the Union Home Minister and the Union Petroleum Minister.

It was on August 16, 1985 that the Union Home Minister declared the decision to "establish an oil refinery in Assam" as a part of suo-moto statement in both Houses of Parliament. The statement had said that the Government will render all possible assistance in terms of institutional and bank finance to facilitate the establishment of a refinery in the private sector.

What has followed since then is a tug of war between the non-Congress (I) State Government in Assam and the Centre. A review of the case reveals the fact that both the sides were more interested in scoring political advantages over each other rather than finalising the plans for setting up the refinery.

Following the Home Minister's announcement in Parliament, the Government set up a working group with representatives from the Ministry of Petroleum and Natural Gas, Planning Commission, Oil Co-ordination Committee (OCC), IOC, etc. to consider the various aspects and recommend the feasibility of establishing a refinery in Assam.

The working group recommended the setting up of a refinery with two million tonnes per annum capacity. The refinery, however, could have provision for expansion up to three MTPA in case additional crude oil becomes available. Even though the refinery was, initially

envisaged in the private sector, the Assam Government could not persuade any private promoter to come forward for investment in this venture.

The State Government then started insisting on a refinery in the joint sector with the participation of the Centre. The State Government also wanted to have a petrochemical refinery.

These aspects were examined by the Ministry of Petroleum and Natural Gas and a note for the Cabinet was submitted in October 1987. The Cabinet agreed to the setting up of a two MTPA grassroot refinery in the Central sector. It was also felt that a petrochemical refinery was not feasible, being uneconomical.

The Cabinet while considering this proposal desired that before setting up the refinery in the public sector, suitable assurances from the Assam Government may be obtained to the effect that they will fully co-operate with ONGC and OIL in their operations, grant necessary licences for prospecting oil and also ensure uninterrupted supply of crude oil to all the refineries including Baruani.

Meanwhile the Assam Government pressed for the formation of a separate company and the participation of the State Government therein. The Centre, however, said that IOC could take up the setting up of a refinery in Assam with its own resources by taking advantage of the various tax concessions etc.

OIL COMPANY BAGS NIGERIAN ORDER

Petroleum India International, a consortium of nine public sector undertakings from the petroleum and petrochemical sector, has bagged a prestigious Rs. 9.54-crore (\$4.4 million) order from Nigeria jointly with UOP

Management Services Inc. of the U.S. against stiff global competition.

This has been the first major assignment for the PII since its inception in 1986. Official circles, however, feel that in the near future there may be many more jobs for the PII, judging from the inquiries received so far.

These include an offer from UNIDO for providing technical support to refineries in Saudi Arabia -- the largest oil producer in West Asia.

Official circles at New Delhi believe India will be able to obtain many more orders from abroad because of the vast improvement in technical skills achieved over the past few years.

The letter of intent issued to PII by Nigeria recently envisages a one-year contract for operational assistance and technical back-up services after the start of the new Port Harcourt refinery of the Nigerian National Petroleum Corporation.

The seven-million tonne Port Harcourt refinery is scheduled to go on stream shortly.

Inquiries have revealed that the total project cost is \$6.3 million of which Petroleum India International will have major share of \$4.4 million (Rs. 6.6 crores). The project will be headed by a plant manager to be nominated by Petroleum India International.

The member companies of PII are: Bharat Petroleum Corporation, Bongai-gaon Refinery and Petrochemicals, Cochin Refinery, Engineers India Limited, Hindustan Petroleum Corporation, Indo-Burma Petroleum Company, Indian Oil Corporation, Indian Petrochemicals Corporation and Madras Refineries. While the management committee is headed by the Indian Oil chief, Mr. S.L. Khosla, a senior executive from IOC, Mr. O.P. Sehgal, is the executive chairman.

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Gas pipeline under sea contemplated

Prime Minister Rajiv Gandhi has asked the petroleum ministry to consider seriously a proposal to lay an undersea gas pipeline linking the South Bassein and South/mid-Tapti offshore basins with Pipavav in Saurashtra coast.

The proposal submitted to him by Mr. Sanant Mehta, former finance minister of Gujarat and presently chairman of Narmada Sardar Sarovar Corporation Ltd., envisages that the pipeline from the landfall point of Pipavav could pass through Dandhuka and join the HBJ pipeline near the state border.

With this, now the Union government has two alternative proposals before it to bolster the capacity of HBJ pipeline. One is to lay a parallel undersea pipeline near the existing one which links Bombay High and Bassein Basins to HBJ line via the landfall point at Hazira in south Gujarat. The other proposal is to lay a pipeline according to Mr. Sanant Mehta's proposal with Pipavav at the landfall point.

The ONGC is understood to have approached the World Bank for finances. Many members of the Planning Commission and Oil and Natural Gas Commission are understood to be in favour of accepting Mr. Mehta's proposal, because it has the following additional merits:

A. The entire Saurashtra peninsula is underdeveloped due to lack of easy access to energy sources like coal and some modest amount of gas supplied from Bassein and Tapti basins would not only help to boost industrialisation but also farming in Saurashtra, central and south Gujarat, without reducing the overall gas availability to the HBJ system.

B. The alternative proposal is difficult to carry out because the Hazira industrial complex is already congested. Any more load would be too expensive and not conducive to growth.

C. Some technical experts view the alternative proposal with considerable alarm, because in the event of any calamity like earthquake or explosion the nearby parallel gas pipelines would both cease to function. It is not wise to put both the eggs in the same basket, but instead build a separate line away from the existing one.

MINERALS POLICY BEING REVISED

The National minerals policy is expected to be finalised shortly. The draft of the policy is being revised in the light of observations received from the States, concerned Central Agencies

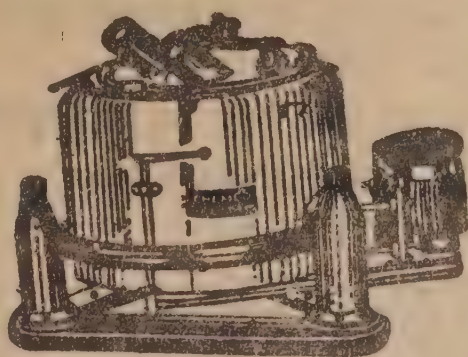
and the members of Parliamentary Consultative Committee of the Ministry of Steel and Mines. The primary thrust of the policy document is on assured supply of mineral-based inputs to the user industries, avoidance of wastage of resources and optimisation of their utilisation.

It also envisages that the indigenous mineral industry should be gradually attuned to the changing international economic situation. According to the annual report of the Department of Mines, the mineral output has exceeded the targets in some areas while in others, it has been below them.

The aluminium production in the financial year 1988-89 is expected to touch 3,60,000 tonnes, representing an increase of 30% over the previous year. A major thrust is being given to the export of alumina, aluminium and its products. The National Aluminium Co. Ltd. had till June 1988 exported over 3 lakh tonnes of alumina and about 6,000 tonnes of aluminium. The company is likely to earn about Rs. 200 crores in foreign exchange during the year. A total of Rs. 2,383.19 crores had been spent on the project till November 1988 against the approved revised cost estimates of Rs. 2,408.14 crores. The other public sector concern Bharat Aluminium Co. Ltd. achieved 92.5% capacity utilisation during the year.

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ONGC profits up 13%

The profit (before tax) earned by the Oil and Natural Gas Commission (ONGC) during 1988-89 at Rs. 2,303 crores is 13 per cent higher over the corresponding figure of Rs. 2,042.26 crores for the previous year.

According to ONGC, its contribution to the exchequer during 1988-89 at Rs. 3,592.03 crores was 15 per cent more compared to the figure of Rs. 3,128.52 crores for 1987-88.

The crude oil production by ONGC in 1988-89 was 29.64 million tonnes against the target of 29.28 million tonnes. This represents an increase of 17.3 lakh tonnes over the past year's production of 27.91 million tonnes. Gas supplies went up nearly 19 per cent with a figure of 6969 million cubic metres.

LPG production of 674,000 tonnes indicated a 113 per cent achievement against the target of 595,000 tonnes.

The seismic field parties recorded figures of 39708 slk (offshore) and 66110 slk (onshore) against targets of 35000 slk and 37122 slk respectively.

A review of 1988-89 shows that the year saw 12 new consumers benefiting from ONGC's gas supply. These ranged from tea plantation and brick kilns in eastern India to industrial units in the

south. Domestic gas supply for Sibsagar town in Assam also was one of the major highlights. The cumulative gas supply to GAIL during 1983-89 was 1.3 billion cubic metres.

ONGC also strengthened its infrastructure for transportation of gas through the commissioning of about 108 kms. of gas pipeline in Gujarat and Andhra Pradesh. This comprises the 72-km pipeline from Narsapur to Kovvur which incidentally is the first gas pipeline in the south and a 36-km gas pipeline to transport gas from Gandhar.

Domestic gas supply was also started in Agartala. The supply would be extended to the industrial complex and to the proposed compressed natural gas refuelling station coming up at Agartala.

About 40 new structures were taken up for drilling during 1988-89 in onland and offshore locations. Nineteen more rigs joined the ONGC fleet taking the total rig count to 137. ONGC added to its offshore rigs, Sagar Kiran -- the first indigenous jackup rig.

The Commission is drilling its deepest well in Jawala Mukhi, Himachal Pradesh, which is targeted to reach a depth of 7000 metres. With the successful drilling of six horizontal wells, Oil and

Natural Gas Commission has emerged as one of the few companies in the world having expertise in drilling of the horizontal wells.

Specific measures have been taken by ONGC in controlling the cost of drilling and improving the productivity of this critical operation. These include dragging the rigs, modification of the mast, leap frogging cluster drilling, onland induction of mobile rigs, induction of desertworthy rigs and computer aided drilling.

The future thrust areas of Oil and Natural Gas Commission would include technology upgradation of offshore information technology, robotics, laser technology, establishing profit centres within the organisation for optimisation of resources and further improvement in efficiency through formation of subsidiary companies.

By the year 2004, the commission would be able to produce 65 million tonnes of crude oil and 55 million tonnes of oil equivalent of gas. The country will have to evolve and implement an energy plan to be self sufficient, Col. Wahi said.

Over 200 joint venture proposals have been received with offers of service to ONGC in various areas of operations.



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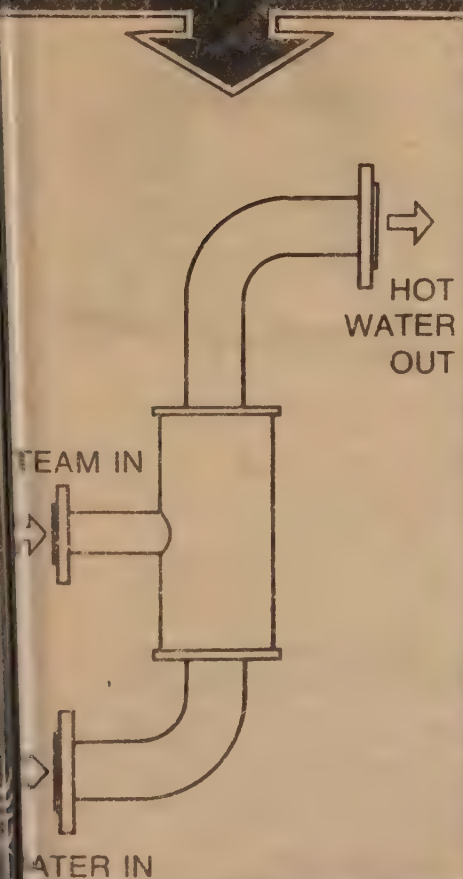
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SPOTLIGHT ON

Biotechnology & Life Sciences (Part-1)

HIGH PURITY ACETONITRILE SOLVENT FOR DNA SYNTHESIS AND SEQUENCING MARKETING

J.T.Baker (U.K.), has recently marketed Baker Bio-Analyser, a high purity, low water, acetonitrile solvent, which was developed for biotechnology applications, including DNA synthesis and sequencing.

Specifications include low residue after evaporation, low-level of trace metal impurities and a small boiling point range. It also has low absorbance at critical wave-lengths. For further information contact; J.T.Baker (UK), P.O. Box 9, Hayes Gate House, 270 Exbridge Rd, Hayes, Middlesex, UK.

PLANT SCIENTISTS BREAKTHROUGH ON THE STRUCTURE OF RUBISCO ENZYME

Researchers at the Sweden University of Agricultural Sciences and Department have described for the first time the structure of the active site of the key plant enzyme Rubisco. A better understanding of this enzyme's activity could lead to more efficient, higher yielding crops.

The enzyme, which is the most abundant protein on earth, is responsible for catalyzing two competing reactions. It catalyses the carboxylation step in the alvin cycle which ultimately converts carbon dioxide to sugars using solar energy trapped during photosynthesis. It also catalyzes the competing photorespiration reaction during which a considerable amount of stored energy is converted to heat, thus limiting crop yields. Plant scientists are hoping to modify the latter activity to improve the fixation efficiency.

By determining the crystal structure of the enzyme's active site, the researchers are one step closer to determining how the enzyme works. In higher plants the enzyme spends about two thirds of its time catalyzing carboxylation and the rest photorespiration whereas in lower photosynthetic organisms the carbon fixation activity is less efficient.

Dr. Alfred Keys, at the Institute of Arable Crop Research, Rothamstead, explains that one goal of plant researchers is to determine whether nature's evolutionary advances in the enzyme's efficiency can be further improved. In the longer term, scientists may be able to introduce a modified, more efficient enzyme into other plants.

Researchers caution that to date all attempts to improve carboxylation at the expense of photorespiration have failed. But if the process can be copied chemically than it may be possible to utilize carbon dioxide better. Moreover, it may even provide a solution to the problems of the so called greenhouse effect. (*ECN* 1/30/89, p. 13).

ICI EXPANDS ITS INTEREST IN BIOTECHNOLOGY WITH CONFIDENCE

ICI has announced that it is expanding its interest in biotechnology with the acquisition of Cambridge Research Biochemicals Ltd (CRB) which supplies peptides, antibodies and other biochemicals. According to one UK report this transaction involves about £5-6 million.

CRB will become part of ICI's Biological Products Business (headquartered at Billingham), which exploits the products of biotechnology in international markets. CRB which has a staff

of about 60, will continue to operate from Cambridge. There are plans to expand its core business in peptides and antibodies, particularly for the health-care markets. ICI's Biological Products Division recently announced the investment of £10 million in a new fermentation plant at its Billingham site.

CRB has pioneered the commercial exploitation of an improved method for peptides synthesis originally developed at the MRC Laboratory of Molecular Biology in Cambridge. It has been engaged in the routine production of peptides and, in the last 3 years, has widened its technology base through the application of synthetic peptides to generate antibodies for use as research and diagnostic reagents, particularly in the cancer field.

The world biotechnology market is worth 'several hundred million dollars annually', ICI noted, adding that the CRB acquisition was part of its plan to become a world leader in the marketing and development of biochemical products. ICI Biological Products already has 250 employees involved in the production of biotech products for industrial, agricultural and environmental applications. (*Scrip*, 2/10/89, p. 8)

ENZYMATRIX LTD (UK) WINS BTG RESEARCH AWARD FOR ENZYME TECHNOLOGY

The British Technology Group's (BTG) research award of £20,000 has been won by Enzymatrix Ltd of Babraham, Cambridgeshire (UK). Enzymatrix is a new biotech company specialising in the application of fermentation and enzyme technology to manufacture novel, highly pure specialty products. The Company has developed recently unique enzyme puri-

fication and biotransformation processes and will market the novel products from these processes to the diagnostic, pharmaceutical and fine chemical industries worldwide. (*Scrip*, 2/10/89 p. 16)

DNA PLANT TECHNOLOGY ANNOUNCES THREE JOINT VENTURES TO DEVELOP BIOTECH PLANTS

Just a few weeks after signing a joint-venture with Du Pont to commercialize its genetically engineered vegetables, agricultural biotech firm DNA Plant Technology has announced it will enter into a joint-venture with two firms in the Netherlands to develop and market superior varieties of ornamental plants.

Immediate target include the development of novel colours and colour patterns in cut flowers. In the long run, the Company hopes to address disease resistance, the prolonging of plant life and breeding methods that create healthier plants.

Under the deal, the Company will give its Dutch partners exclusive use of its plant technology in exchange for capital and in some cases, expertise. Its two main partners, Zaadunie V.V., a preeminent breeder of vegetables and flowers in Europe, which will own a 29% share and Rabobank Biotech Venture Fund, which will own 27% of the venture, will provide the capital. The initial capitalization of the Company is set at \$8.4 million, 40% of which will be given to the new company initially and the remaining 60% over a two year period as goals in R & D programmes are reached. (*CMR*, 12/12/88 p. 33)

THE FIRST SUCCESSFUL CLONING OF A RAT D2-DOPAMINE RECEPTOR REPORTED BY US RESEARCHERS

The American researchers Oliver Civelli and his workers from the Oregon

Health Sciences University in Portland, Oregon, USA have succeeded in cloning a rat D2 -dopamine receptor for the first time. The successful cloning of a rat D2 -receptor is an important achievement for several reasons.

(a) D2 -receptors have been implicated in the pathology of parkinsonism, schizophrenia and tardive dyskinesia but the molecular bases of these neurological and psychiatric disorders is far from being understood. This is largely due to the lack of experimental approaches to study changes in concentration and distribution of dopamine receptors both in situ and in-vitro. With genetic probes of the D2 receptor at hand (and probes of other dopamine receptor probably available soon), the prospect of such studies has heightened dramatically.

(b) The isolation of an intron-containing G-protein coupled receptor gene may help elucidating the evolution of these genes. Other recently cloned G-protein coupled receptor genes with intronic sequences are a 5HT_{1c} and a substance K receptor (*Proc. Nat-Acad. Sci, USA* 84, 4332-4336; *Nature* 329, 836-838). These receptors all differ in their splicing patterns from those of the opsins.

(c) Finally, the employed cloning strategy may permit the isolation of other (yet unknown) members of the same gene family including dopamine receptors of other subtypes. As a word of caution, however, it is said that several groups have previously tried the same strategy in order to isolate genes coding for unknown members of the gene family of ligand-gated ion channels, but without success. (*Trends In Biochemical Sciences*, Vol 14, No-2, p. 41-42)

DECHEMA INSTITUTE PIONEERS A COURSE ON SAFETY IN BIOTECHNOLOGY

Dechema Institute in Frankfurt, West Germany in 1988 pioneered the world's

first course dealing with the safe handling of genetically engineered organisms. The new course, titled 'Safe Biotechnology' consists of 12 modules, each lasting a week. A participant may take all three or select just one depending on his, or her particular interest and level of expertise. The development of the curriculum was funded by West Germany's Ministry of Research & Technology. The plan is to run the course twice a year, at least initially, and raise number of people taking it to about 35 per session.

The first module in the course deals with the safe use of genemodified material at the laboratory level. Lectures and lab work centre on microbiology, virology, oncology and so forth.

The second is concerned with safety aspects of large scale production processes, especially in the areas of cell culture and fermentation. It deals with aseptic production methods, and the safe handling of waste products and of liquid and gaseous effluents.

The third module consists of patent and pencil studies. It covers a broad range of legal issues and West German federal and state laws relating to biotechnology and industrial medicine.

In the near future, the course work and accompanying text might eventually be translated into English, French, Japanese and other languages and made available on a copyright fee basis. (*CMR*, 12/5/89 p. 31-32)

AN ETHYLENE-RESISTANT MUTANT PLANT

Ethylene is an endogenous plant growth regulator that influences seed germination and seedling growth, leaf abscission, organescence, fruit ripening and various plant responses to pathogens, wounds and stress. Hardly anything is known about how growth regulators such as ethylene act, how plant tissues recognize them, and how they

ognition signal is transduced to yield responses. Researchers Bleecker et. al. at the Plant Research Laboratory (Michigan State University, USA) have recently isolated a mutant of *Arabidopsis thaliana* that lacks a number of responses to ethylene although it is similar in appearance to wildtype plants, indicating that the mutation did not affect major developmental processes.

The mutant plant line was insensitive to the action of ethylene on the inhibition of cell elongation, promotion of seed germination and acceleration of leaf senescence. These responses occur in different tissues, suggesting that a single receptor for ethylene may be present and altered by the mutation. (*Science*, 8/26/88 p. 1086-1088)

AN UPDATE ON RESEARCH IN LIFE SCIENCES IN JAPAN

The Japanese pharmaceutical industry contributed 60% of Japan's total private sector investment of Yen 433,800 million (\$3,445 million) in life science related research and development during 1987. Overall life science R & D investment (public and private sectors) for the year at Yen 1,011,300 million, was 10.2% up on 1986, according to data from the Management & Coordination Agency's Life Science Research Survey, quoted in Pharma Japan.

1987 spending on life science R & D by Japanese pharmaceutical manufacturers was Yen 302,100 million, 6.6% more than in the previous year. Investment by the industry in r-DNA technologies fell by 2.3% following a growth of 50% in the previous year. Overall Japanese investment in this area, including input from research agencies/institutes and universities, was Yen 400 million up by 15.5% on 1986, Pharma Japan reports.

The total number of research work-engaged in life science R & D in Japan increased by 4.6% to 126,891, 8% of whom were employed by private companies. Around 5,338 were

involved in r-DNA research. (*Scrip*, 1/27/89, p. 18)

AGROBIOTECH RESEARCH GIVES A THRUST FORWARD TO MONSANTO'S HERBICIDE BUSINESS

Monsanto Company announced recently that its researchers have genetically engineered cotton for tolerance to the company's non selective 'Roundup' herbicide, a trait of major potential commercial significance.

The cotton plants tolerant to 'roundup' herbicide are being researched to aid farmers in better controlling such weeds as cocklebur, morning glory, prickly sida and Johnson-grass, which costs farmers millions of dollars annually in weed control. Roundup herbicide tolerance in cotton is a major achievement for Monsanto and it will be of great interest to cotton farmers. Monsanto technology will allow farmers to have greater flexibility with better results in controlling weeds — essential for optimum yield and quality in cotton.

Monsanto researchers also recently announced success in genetically engineering soybeans for Roundup herbicide tolerance — a milestone for the biotechnology science of crop transformation. The company also has reported success in genetically engineering various agronomically important traits into canola and tomato and field testing those crops last summer in USA.

Genetically engineered cotton plants were produced using an Agrobacterium mediated gene transfer system. Agrobacterium tumefaciens has the natural ability to transfer some of its own DNA into plant cells. However, the result is usually a type of injury known as crown gall. Monsanto researchers developed a method to stop the Agrobacterium from causing crown gall, while at the same time keeping the ability to insert DNA into plant cells. The altered plant cells were then regenerated into healthy cotton plants through a process called

tissue culture.

Monsanto researchers sprayed the progeny of the transgenic cotton plants with rates up to three pints per acre of 'Roundup' herbicide. The genetically engineered cotton exhibited excellent tolerance to the herbicide even at the highest rate. The commercialization of this trait will provide significant benefits for cotton farmers by allowing them to use a herbicide that is both highly effective, especially for no tillage programmes, and environmentally sound.

The USDA estimated the value of the 1987 cotton crop at \$4.5 billion in USA. The National Cotton Council estimated weed control costs for US farmers average \$35 to \$45 per acre. (*CMR*, 11/21/88, p.5)

A NEW ETHANOL PRODUCTION PROCESS BASED ON RAW CEREAL STARCH AS STARTING RAW MATERIAL

Biodyne Bourgogne has developed a new proprietary process for ethanol and other co-products production, using raw cereal starch. The biotech process which is based on simultaneous hydrolysis and fermentation of raw starch at a low temperature is fully continuous and takes place in a single stage fermentor.

UNITED NATIONS CONSIDERS BIODIVERSITY CONVENTION

Concerned that existing international laws are not sufficient to halt the rapid disappearance of many of the world's species, the United Nations Environment Programme (UNEP) has taken the first step, in what is usually a 10-year process, to draft a new global convention for the conservation of biological diversity.

The tricky question, obviously, is where money for the fund will come from. One possibility is voluntary contributions by governments, another is a tax on the use of genetic resources. (*Sciences*, Vol.211, p. 1604).

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Food and Pharmaceutical Technology in Perspective

NEW DETERGENT ENZYME UNVEILED BY CORNELL UNIVERSITY RESEARCHER

A Cornell University researcher has discovered an enzyme that reportedly breaks down cellulose and protein stains many times faster than current detergent enzyme.

The new enzyme called YX, is said to be more potent because it remains active at high temperatures and in the presence of alkali bleaching agents and chemicals. Todd Gusek of Cornell University recently reported to Wall Street Journal that the new enzyme is 13-times faster in action than subtilisin, the standard detergent enzyme, and 13-times more efficient than thermolysin, the enzyme used to make the artificial sweetener aspartame. YX has potential in the food and detergent industries and several companies have apparently expressed interest in Cornell's Patents and Licensing Office.

The problem facing the new enzyme in its large scale manufacture, which Cornell University hopes to do via genetic engineering. (*Mfg. Chem.*, 2/1989, p. 9).

IMPROVING ORGANOLEPTIC AND NUTRITIONAL QUALITIES OF DAIRY PRODUCTS VIA BIOTECHNOLOGY

Enhancing the flavour and textures of fermented dairy products by genetic engineering will be possible in future. Though genetic engineering, it will be possible to construct starter cultures that confer unique qualities to fermented products. For example, it may be possible to develop cultures capable of producing natural flavour compounds (such as banana, berry, citrus) or protein with intrinsic non-caloric sweetness

properties (aspartame, therimatin, stevioloside) to enhance the flavour and eliminate the need to add sucrose during the manufacture of yoghurt or flavoured cheese spreads. Construction of strains capable of producing extracellular polysaccharides would eliminate the need for the addition of stabilizing or thickening agents in yoghurt.

Dairy products serve as a primary source of calcium in the human diet. In addition they are an excellent source of protein and fat-soluble vitamins. However, most dairy products, with the exception of yoghurt and cottage cheese are often high in saturated fats and cholesterol. In the future, it may be possible to engineer starter cultures with the capability of enzymatically modifying cholesterol to nonatherogenic steroid derivatives. Similarly, it may be possible to enzymatically modify the saturation level of fat or to alter the absorbability of saturated fats fraction. (*JAOCs*, 11/1988, p. 1929-30).

FOOD ADDITIVES MARKET IN THE EEC

European markets for food additives will expand despite safety concerns according to a recent study by Frost & Sullivan. However, overall growth in Belgium, Luxembourg, France, West Germany, Italy, the Netherlands and the UK will gradually rise from 2,231,400 tons in 1987 to 2,243,900 tons in 1992.

The study predicted consumption of emulsifiers, phosphates, hydrocolloids, humectants, sequestrants, acids and non-caloric sweeteners would increase, use of salt, colours, yeast and preservatives will decline. It also predicts dramatic growth in future for low-calorie products such as polydextrose and other similar compounds. (*JAOCs*, 11/1988, p. 15).

MONOMERIC INSULIN -- A NEW FORM OF INSULIN FROM PROTEIN ENGINEERING RESEARCH

A new form of insulin modified by protein engineering, has been produced and successfully tested by Danish scientists at the Novo Research Institute. The new insulin -- Monomeric Insulin (MI) as it is called -- is one of the first examples of protein engineering successfully applied to a clinical and commercial end.

MI when injected subcutaneously, is designed to be absorbed 3-times faster into the bloodstream than the most rapidly absorbed insulins in use today and prevent abnormally high levels of blood sugar.

MI, made by altered human genes implanted in cultures of yeast cells, has been tested on 6 diabetic patients by researchers at the University of Wales, College of Medicine at Cardiff, UK. Injections of insulin have to be given about half an hour before a meal, not earlier, because of the risk of hypoglycaemia. Because of the slowness with which all insulins now available are absorbed into the bloodstream from subcutaneous injections, this means that the peak of insulin concentrations in the bloodstream occurs seventy to eighty minutes after a meal.

Tests carried out by researchers suggest that MI is absorbed so much faster that insulin levels peak after a meal in time to avoid hypoglycaemia. This result shows that MI will have a major effect on the long-term complications of diabetes when it becomes commercially available, since hypoglycaemia is thought to be largely responsible for such complications. However MI will

be introduced on the market only after long term trials extending over 2-3 years. The new MI differs less from normal human insulin, (in only tiny alterations to the natural molecule of human insulin) than do pig or bovine insulin, which are already used for treatment without rejection problems. (*The Practitioner*, 10/8/88, p. 1063).

A NEW TRANSDERMAL DRUG-DELIVERY SYSTEM BASED ON ELECTRO OSMOSIS

A novel transdermal ('Powerpatch') system has been used successfully to administer therapeutic doses of leuporein in healthy volunteers. According to researchers, this novel approach in drug delivery is of major importance for the development of new techniques for drug administration.

This new drug delivery system has been developed by a New York based company, Drug Delivery Systems Inc. (East 86 St., New York 10028, USA). It consists of a 90 cm² patch containing an intrinsic power source supplied by small disc batteries, a resistance system current, electronic conditioning components and two drug reservoirs, are of which is at the positive electrode, the other at the negative electrode. On application to the skin, the electrical circuit is completed, causing current to flow, the magnitude of which can be controlled.

In a study conducted at North Shore University Medical School and Body-dynamics Inc, cutaneous absorption of TAP Pharmaceuticals' nonpeptide LHRH analogue, leuporein, was compared over an 8-hour period in active transdermal patches containing 0.2 mA electrical current and passive patches with no current.

Significant elevations of serum LH were observed in patients with active patches, reaching levels comparable with those achieved with subcutaneous administration of the drug. The patches

were well tolerated without significant cutaneous toxicity or injury to the skin.

Researchers, who developed the new delivery system believe that the mechanism of transdermal transport is unlikely to be iontophoretic, in view of the large size of the molecule and its relatively low polarity. The most likely absorption mechanism is electro osmosis, in which the movement of water caused by an electric current leads to the secondary flow of solutes, they suggest.

The researchers conclude that the use of low levels of electrical current can induce changes in the permeability of the stratum corneum -- sufficient to promote the transdermal absorption of the therapeutically relevant amounts of a polypeptide.

Although, there are many potential candidates for this mode of delivery, the study may have particular significance in peptide and polypeptide administration since these compounds currently rely on I.V. or S.C. delivery owing to their extreme gastro-intestinal instability, and only limited success has been achieved with alternative routes, such as buccal and intra-nasal delivery. The company has received several US Patents for the Powerpatch and has filed for patent protection in 23 other countries. (*Clinical Pharmacol & Therapeut.*, 12/1988, p. 607).

VIT. E AND GLUTATHIONE LINKED TO GREATER IMMUNITY IN THE ELDERLY

Some dietary antioxidants, particularly Vit. E and glutathione, can improve immune system responsiveness in the elderly, according to Simin Nibken Meydani, a researcher with USDA's Human Nutrition Research Centre on ageing at Tufts University.

Meydani reports that on a study of 34 healthy, elderly human subjects, those receiving Vit E supplements for one month showed increased cellular

immunity. These results indicate dietary requirements for Vit E may be greater than currently recommended. How the antioxidants work is unknown but studies using Vit E have indicated the production of interleukin-2 increases, whereas the production of prostaglandin E-2 decreases. Interleukin-2 promotes the production of white blood cells; prostaglandin E-2 suppresses white blood cells and the body seeks to make more of the substances with age.

Recent research suggests that intervention in the ageing process through increased intake of dietary antioxidants like Vit E may be beneficial, but further research is necessary to substantiate the hypothesis. Meydani also reports experiments on animals that showed dietary requirements for Vit E increased with greater consumption of polyunsaturated fats. (*JAOCs*, 11/1988, p. 1715-16)

A NEW COCONUT OIL DERIVED SURFACTANT DEVELOPED IN USA

In India, coconut oil finds use in foods and edible products. However, worldwide, use of coconut oil in edible products is declining, while its use in industrial and soap products is progressing. Market for coconut oil fatty acids is also growing slowly in USA. There is a long term trend towards increased use of coconut and palm kernel oils and fatty alcohols. Two new UD alcohol plants have been announced.

Recently, Stepan Company has unveiled Alpha Step ML-40, a new safe biodegradable anionic surfactant. The alpha sulfomethyl ester product is derived from a natural renewable resource -- coconut oil -- and is completely independent of ethylene based raw materials.

Alpha-Step ML-40, an aqueous solution of sodium alpha sulfo-methyl ethyl laurate, exhibits food detergent and foam properties, in addition to being

excellent solubilizing agent -- for high active systems and readily soluble water. Dry skin irritation studies show the new surfactant is milder than conventional lauryl ether sulfate.

It is recommended for use in heavy duty laundry detergents, manual liquid dishwash, fine fabric wash, hard surface cleaner, shampoos, liquid hand soap and bubble baths. (CMR, 1/23/89, p. 19).

NEW PROTEIN-RICH CORN OIL DEVELOPED

Corn kernels contain less than 10% protein. This low protein content does not match up too well against something like soybeans, which contain 38% protein. In addition, the corn protein is low in two 'nutritionally vital' amino acids, lysine and tryptophan. Research work which began in USA in the 1970s to increase corn's lysine content has now come to fruition, and the researchers are seeking a patent on the technology. Cytogeneticist Ron Phillips and his research group at the University of Minnesota have found a gene that affects lysine production sometimes increasing it as much as 20%.

The University of Minnesota researchers note that an improved corn variety as nutritious as the ordinary variety was recently introduced in Mexico. But that corn gave 'flaky, soft kernels that do not store well' and the improvements depend on 'a complex genetic system, rather than one gene that gives high lysine' Phillips reports. The new corn variety developed by the Phillips group brings no undesirable effects, and the fertility and quality of the corn is completely normal. (Chem. Wk., 2/6/89, p. 18).

NEW LIGHT ON THE CHEMICAL MECHANISM OF BITTER TASTE

Bitter tastes are rather different from other kinds of taste we perceive -- sweet, salty or sour. Not only are they less pleasant, even at low concentra-

tions, but they help us to avoid hazardous foods.

The surface of the tongue responds electrically to sweet, salty or sour tastes; the electrical change results in a response in the gustatory (taste) nerve. But bitter tastes provoke no such currents.

Now researchers, Mike Akabas and his colleagues at Columbia University (New York) have found that bitter tastes result in a rise in calcium concentration inside some cells. The researchers first separated out groups of cells from the tongues of rats. They then identified them as taste cells by measuring the response of the cells to a change in the electrical potential across their membranes. The taste cells but not other cells on the tongue responded by producing electric current across the membrane.

The researchers then looked at how the cells responded to bitter tastes, using denatonium chloride, a substance that tastes extremely bitter to humans. One or two cells in each group responded to denatonium by doubling their levels of calcium whereas the other taste cells did not. None of the cells responded with a change in calcium to a sweet stimulus, so the response received specific to bitter taste.

The levels of calcium inside nerve cells normally rise when there is a change in electrical potential across the membrane. The rise in calcium, in turn, leads to the release of a neurotransmitter that the researchers suggest delivers a 'bitter' message to the gustatory nerve, but the responsive cells differed from ordinary nerve cells; changes in electrical potential, the researchers found, made no difference to those cells. Calcium levels rose regardless of a change in potential.

The detection of bitter tastes, the researchers suggest, relies on biochemical changes inside the taste cells, instead of the more usual electrical

changes. Molecules of the bitter substance probably attack receptors on the membrane of taste cells, once attached, they could activate a chemical message inside the cells, which promotes the release of calcium. Whatever that chemical message is, it makes bitter substances taste different. (New Sci., 2/4/89, p. 36).

HIGH FAT, CALORIE DIET LINKED TO COLON CANCER

A new study at the State University of New York (Buffalo), claims to be the first data to directly link the total amount of calories consumed and the risk of colon cancer. The researchers conducted detailed dietary interviews with 428 patients diagnosed with colon cancer and matched controls between 1975 and 1984.

An increased risk of colon cancer corresponded to increases in the amount of both total fat and total calories. In those who consumed the most fat and/or calories, risk of colon cancer was 4-times higher in men and 2.5 times higher in women, compared with their low fat and/or low-calorie diet cohorts.

Consumption of dietary fibre appeared to reduce the risk of colon cancer for women only, with the most significant reduction from high intake of tomatoes, peppers, carrots, onions and celery. (Mod. Med., 12/1988, p.23).

DECAPINOL -- A NEW REVOLUTIONARY ANTI- BACTERIAL ORAL SURFACTANT FOR ORAL HYGIENE

Decapinol, a new revolutionary antibacterial oral surfactant developed by Biosurface AB, a subsidiary of Pharmacia LEO Therapeutics AB of Sweden. Decapinol, is a new landmark in oral hygiene. It is a novel surface active agent that prevents bacteria from adhering to and forming colonies on tooth surfaces.

Decapinol has been in development for several years and is still facing several years of clinical testing before it will be suitable for marketing worldwide. It is expected to be effective in the treatment of diseases caused by dental plaques, such as gingivitis, periodontitis and dental caries. Tests on people who gargled with Dacapinol after three weeks of not brushing their teeth have yielded remarkable results. Clinical trials are expected to be completed by early 1991 with marketing in North America and W. Europe by early 1990s.

Biosurface AB and Warner Lambert Company have entered into a cooperation agreement covering the further developments and subsequent marketing of Decapinol. The product has also received support from the School of Dentistry, University of Lund and financial assistance from the Swedish Industrial Fund. (CMR, 1/16/89, p. 27).

BETA CAROTENE COMING INTO LIMELIGHT IN NUTRITION AND CANCER THERAPY

Beta carotene is one of more than 400 carotenoids found in nature. Carotenoids are responsible for the yellow, orange and red colour of most fruits and vegetables. Beta carotene is increasingly used as natural colouring agent in foods and drugs. Recent studies indicate that they may play a role in reducing the incidence of cancer.

Roche is the world's leading producer of natural beta carotene. Roche's epidemiological studies have shown association between diets high in beta carotene and lower incidence of certain cancers, particularly lung cancer. One study reported in the *New England Journal of Medicine* said that people with low levels of beta carotene in their blood were about two times more likely to develop a common form of lung disease than those with high levels.

In addition, the National Cancer Institute has 14 studies under way that are

attempting to verify the possible role of beta carotene in cancer prevention. Definitive results are not expected in the near future. However, beta carotene's potential benefits is so strong that US authorities have decided to recommend increased consumption of beta carotene rich foods in USA.

Beta carotene is said to act by scavenging free radicals, highly unstable chemicals produced naturally by the

body, as well as by environmental sources, such as cigarette smoke and air pollution. Because free radicals have a tendency to attack DNA, some scientists speculate that free radicals may play a role in causing cancer. In addition to its ability to deactivate free radicals, beta-carotene is the most powerful quencher of singlet oxygen, a reactive chemical species that generates free radicals. (CMR, 1/9/91, p. 14).

25 per cent rise in demand for processed foods likely

With the changing socio-economic conditions and a marked increase in demand for processed foods, the conditions are ripe for a 'brown revolution' in the near future. According to a study by the PHD Chamber of Commerce and Industry, the demand for processed food is likely to grow at the rate of 25% annually. To meet this projected increase in demand, the PHDCCI has suggested measures including duty free import of packaging machinery and materials, expansion of air cargo space and setting up of modern slaughter houses by the private sector.

While appreciating the various incentives given for the promotion of this sector in the current year's Budget, the President of the Chamber, Mr. M.M. Sabharwal, has called for an integrated policy for development of food processing industry and designating it as an umbrella for all agro-industrial development programmes. He also underlined the need for establishing technology missions in selected food processing sectors for achieving time bound results. It is estimated that 15 million tonnes of fruits and vegetables perish at various stages in the journey from the farm to the markets. The value of this loss is estimated at Rs. 3,000 crores per annum, accounting for a high 30% of the total produce. Development of the food processing industry is expected to reduce this loss. Food pro-

cessing also assumes significance as it is the largest generator of employment per rupee invested, being highly labour intensive, besides the high value addition ranging from 50% to 500%. The PHDCCI has pointed out that while the present installed capacity of the industry was 4.45 lakh tonnes, production was only 1.7 lakh tonnes with capacity utilisation of 38% only.

The PHDCCI President underlined the urgent need to raise the level of capacity utilisation. The main constraints faced by the industry, according to Mr. Sabharwal, are high cost of raw materials due to low agri-horti-cultural output, high incidence of taxation on finished goods, high packaging costs and lack of the adequate transportation facilities.

The PHDCCI president observed that unfortunately there has been a tendency to view processed food as a luxury item and taxation policies have kept processed food beyond the reach of the common man. He felt that it was essential to recognise that processed food was after all a food item meant for mass consumption. Reorientation of policies based on this recognition would give necessary fillip to the industry by boosting demand and would help it to achieve economies of scale by encouraging competition and improved quality, he said.

Developing a Perspective Plan*

D.M. MOHUNTA

Vice President, Chemical Industries Association

had consented to speak at this seminar with only a hazy idea of what was in store. The topic which is mentioned in the programme requires considerable knowledge, comprehensive data, and some hard work. Personally I am involved in the formulation of a perspective plan at the all India level in some areas of the chemical industry on behalf of the Chemical Industries Association and I know the problems associated in formulating a credible plan, and it is even more difficult when it comes to regional basis. However there is a pleasant side to the task, it is so easy to let run the imagination and build a bright future, there is Ruritanian atmosphere about it.

There already exists a perspective plan for India for petroleum and petrochemical industries and plans for few more are in the way.

Projections of past trends is one way of going about making a plan. Another way is to look at the potentials. What is the definition of potential, could it be said that potential is what can be made a reality of at a future date. What makes for potential, the availability of feed stocks, raw materials, technology, markets? Does the absence of any one or all of these factors mean a large measure of absence of potential? If such be the case then what was the potential for the steel industry in Japan in the 50's and 60's, what was the potential for becoming the second largest producer of automobiles in the world.

The potential is only limited by the mental horizons of those taking a direct part in the planning and development process namely the bureaucrat and the politicians. If the potential is to be realized then it needs something more tangible; vision, leadership, a steadfastness of purpose, the power to do what ever is necessary to achieve the goals. This is a bit of a digression but I feel a necessary one as there is usually a lot of breast beating that lack of industrialization is due to lack of physical resources and so on and so forth.

The first area to be considered is provision of feed stocks and raw materials. Cochin Refinery has refining capacity of 1 million tonnes and fluid catalyst cracker that has a throughput of 1 million tonnes.

This would give besides the normal refinery products the following:

Ethylene	6,900 tpa
Propylene	38,700 tpa
Propane	12,000 tpa
Butylenes	43,700 tpa
Butenes	36,000 tpa

Out of this, nearly 29,000 tonnes of propylene is earmarked for the production of phenol. This leaves a small quantity of 8-9,000 tonnes which could be supplemented by conversion of propane to propylene and the total will now be a respectable figure of nearly 20,000 tonnes. The small quantity of ethylene is recoverable given the status of present technology. The propylene could be used to manufacture synthetic glycerine and epichlorohydrin.

We are left with a lot of C_4 stream which can be used profitably. In the utilisation of C_4 , a basic fact must be kept in mind that there are possibilities of interconversion between the isomers. There has been considerable strides in the technology of separation and purification of these isomers.

The probable C_4 stream composition is:

Component	Wt %	Quantity TPA
Isobutane	35.4	28400
Isobutene	16.0	12800
Butene-1	11.5	9200
N-Butene	13.0	10400
Butene- C_1S	9.5	7600
Butene-Trans	14.5	11600
Total	100.0	80000

The products that could be manufactured from it are:

Butadiene
Oxo-alcohols
Methyl ethyl ketone
Butyl alcohols, sec, tert
Tri isobutylene
Butylated phenols and cresols
Heptenes
Tert-butyl mercaptan
Amyl alcohol
Tert-butyl benzoic acid
Neopentanoic acid
Butylated hydroxy anisole (BHA)
Methyl tertiary butyl ether (MTBE)
Methyl methacrylate
Maleic anhydride

* Paper presented at the seminar on "Potentials, Problems and Constraints in the growth of chemical industries in Kerala" organised by Chemical Industries Association, KSIDC and Institute of Chemical Engineers, Trivandrum on 18-2-1989.

Polybutylenes
Polyisobutylenes
Butyl rubber
Polyisoprene
Poly (1-butene).

This list is by no means exhaustive but covers commercially manufactured products ranging from a few thousand tons onwards.

A complex which could utilize the entire C_4 stream and additionally recover butane from refinery off gas and producing a large variety of the above mentioned products would have an investment in the range of Rs. 150 to 200 crores. If it is felt that there are constraints to the availability of other petrochemicals precursors a solution to this constraint is available. We are familiar with the thermal cracking of naphtha or other feedstocks. There is another process which can be called the Auto Thermic process. In this process part of the feedstock is burned as fuel to furnish the heat of reaction. There is a long history of development. It is presently considered as a process to make acetylene and not for other olefins, although these are simultaneously produced. Various processes have been developed by Hoechst, BASF, Union Carbide, Montecatini, SBA, etc. The processes are characterized by their adaptability to a large variety of feedstocks, ranging from natural gas to crude oil itself. Some of these processes require oxygen.

The main products in the cracked gas are:

Carbon monoxide
Hydrogen
Acetylene
Ethylene
Methane
 C_3 and higher
Carbon dioxide

There are considerable variations in the product gas composition and probably the economics and markets will dictate the choice of process and conditions of operations.

The ratio of acetylene to ethylene can be varied from 30:70 to 70:30. The carbon monoxide and hydrogen can be separated if necessary or their ratio adjusted to give the synthesis gas for products like methanol, or alcohols by the oxo process.

If we are not thinking of commodity plastics and other large volume ethylene based chemicals, the process ought to be attractive as the plant sizes have ranged from 10000 to 60000 tons per annum of acetylene. Technologically, the same products could be made from acetylene as from ethylene and

in fact, historically, ethylene has displaced acetylene as a building block. In the present context the following could be thought of:

Acetylene black
Butanediol
Butenediol
Butyralactone.

These chemicals find use in the manufacture of herbicides (carbyne), insecticide (endosulfan), vitamin B6, polybuty terephthalate (PBT), polyurethanes, N-methyl pyrrolidone etc. The ethylene along with the ethylene recovered from FCC gases could be converted to ethylene oxide which in turn could be used to manufacture ethylene oxide condensates, surfactants and detergents. Alternatively, ethylene could be oligomerized to alpha olefins to give raw materials for detergents, surfactants, plasticizers, cosmetics. Numerous technologies are available. A little more detailed look at the availability of carbon monoxide and hydrogen is necessary. The two gases as generated in the process are not necessarily in the required ratio for further usage, technologies are now available for getting very pure carbon monoxide and adjusting the ratio of the two gases to suit the needs. Some of the products that could be manufactured are:

Methyl formate
Fatty acids
Diethyl ketone
Propionic acid
Acrylic and methacrylic acid
Dimethyl carbonate
Dimethyl oxalate
Toluene diisocyanate
Dimethyl formamide
Tolualdehyde
Benzaldehyde.

All the above mentioned chemicals have commercial use. There are many other possible chemicals that could be produced. An exercise has to be undertaken to determine the economics of the autothermic process when all the components of the product stream are to be utilized. On the face of it the process appears to be eminently suitable where a wide variety of end products are envisaged and the quantum is such that a large scale naphtha cracker does not make sense.

So far we have been dealing with the provision of raw materials and feed stocks and precursors. I would now enter briefly the world of finished products namely that of engineering plastics.

Engineering Plastics: A plastic having the foregoing characteristics could be classified as engineering plastic.

he mechanical and physical properties of the plastic should be predictable and reproducible as in the case of metals if the design procedures of engineering industry are to be valid.

Speciality chemical raw material bases with few producers. Patent protection on composition and manufacturing processes including production of polymer and monomer.

High development cost and high cost of application development.

High selling price compared to commodity plastics.

Comparatively low volume of demand.

There are exceptions to some of the characteristics but still they are included in the list of engineering plastics. There are about 25 different engineering plastics, there are variations under each generic name. The price under Indian conditions ranges from about Rs. 60 to more than Rs. 200 per kg. The bulk of the price being accounted for by duties and taxes. In these very characteristics lies the potential for a vigorous industry. In spite of the high cost, in many instances the cost of a component from these plastics are cheaper for given service. The primary plastic is never used as such and a host of additives may be incorporated to improve properties and processability. As is well known, a wide variety

of processes are used for fabrication and processing into finished components. The number of processes are about 19.

The trend towards the greater use of plastics appears to be irreversible. 300 kg of wt. in an western automobile has been replaced by plastics weighing about 90 kg. resulting in an enormous saving in fuel.

Technology has come up with plastics of greater range of properties, enveloping more and more applications under stringent conditions of loading, stress, temperature, etc. The Indian scene is encouraging because with the induction of latest technology and high technology, plastics are increasingly specified for number of components and in increasing quantities. The main inhibiting factor has been the high price as a result of deliberate policy to keep the prices of petroleum based raw materials high.

Conclusion: It is possible to have a cost effective chemical industry in Kerala with very wide ranging product mix at a moderate capital cost. The technologies are available and require innovative application. In addition, a engineering plastic industry could be developed which has a high technological content and would utilise the availability of highly skilled personnel.

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(KNS-ADI)

Import Substitution of Oil Field Chemicals

B. NARAYANA MURTHY

Chairman & Managing Director, Kalpana Chemicals Pvt. Ltd.

ould an entrepreneur set up a factory and then go around C for orders? or ONGC place a letter of intent based which a factory is to be set up?

e import substitution meetings of ONGC held from time e discuss various aspects of development of import sub- on of chemicals and materials.

he question is whether all industries should simultane- usly try to develop these products, or 2 or 3 industries re identified to develop the particular items and they are ssued a go-ahead depending on their capability and choice.

Whether ONGC co-operates by giving test results free f cost because the R & D work involves lacs of rupees rom industry with no prospects of ONGC assuring a market. The expenditure by the industry will be totally shot in the dark, while ONGC does not come down ven one rung.

After developing the product by one or more entrepre- urs the rate-race starts and the tender system takes over. t is not whether any particular industry can get the order or the particular period or not, depending on the tender, ut throat competition etc.

a tender is lost for an year, the industry will be idle or a year which involves huge financial losses, leads to e labour-unrest, lay-offs etc. and finally financial insti- tion's fore-closure of their loans.

When a sample gets passed in the tender, with all the search and effort of the industry, the ONGC is to assess e capability of the entrepreneur to produce the material.

e inspection team inspects the facilities and they believe at each product should have a separate factory ready cater to the ONGC needs. Factories cannot be put up thout firm orders or letters of intent.

set up a factory financial institutions and banks need firm order or letter of intent on which they would like study the financial viability and sanction the project.

ually any chemical product can be manufactured pro- ded the unit operations involved in the manufacturing ocess are provided as common facility in a factory. th these various unit operations and reactors, not one several chemicals can be manufactured with over all

(cumulative) product capacity being more or less the same. Whereas this aspect is not understood by the var- ious visiting teams and they give their own assessment based on their limited industrial experience.

9. The inspection team expects to see everything and try to understand everything and the entrepreneur who has developed this product with great personal sacrifices and strain are afraid that the secrets will be unsafe. So the entrepreneur keeps a closed fist and draws a blank out of the inspection.

10. After going through the formalities of inspection a trial order or a regular order may be placed, if the team believes that there is a separate factory to manufacture the item.

After crossing all these hurdles,

1. The Indian parties are given different payment conditions wherein 90% payment is released against documents through bank. They will have to spend upto 6% to get the 10% detained payments. The bank guarantees accumulate, inspite of the fact that the orders are executed. As the Bank guarantees are not returned in time, it causes a great finan- cial strain on the manufacturers.

2. The promised Deemed Export benefits like CCS, Advance licences, duty draw backs etc. are not received by the entrepreneur, and if at all they receive one or two ben- efits, they come as late as an year and a half or more. Con- trary to this, the tender calls for the calculations of all these benefits in the pricing before quoting the lowest. Thus the manufacturer has to work on reduced cash flow basis.

3. The order specifies that deliveries should start within 60 days or penalty clauses will be imposed. How can a fac- tory start manufacturing new products and offer huge quan- tities in 60 days? Even raw material procurement and finance line-up take more time.

4. The waiting period from one tender finalisation to another tender finalisation is a hell for the import substitute entrep- reneur. Their unit will be idle for periods of 6 months and more at a time and they are not sure of the next order. Coding and decoding of samples also plays havoc.

5. These and several other difficulties are to be faced by indi- genous manufacturers who substitute imports.

6. Even in cases where the delivery schedule is not main- tained due to the time taken for the import of raw mater-

ials, ONGC insists on delivery schedule starting within two months after placement of the order. These two months are not sufficient even to locate the proper raw material supplier. If the raw material is to be imported it takes minimum 6 months to line up, suppliers, finances, Bank support, shipment time, customs clearance etc.

7. After doing all this ONGC may discontinue the use of the product as it is not a must for oil drilling.
8. After the order is received and order execution starts the problem of specifications, testing methods etc. starts. The king does no wrongs and so also ONGC does not make any mistakes. All wrongs are that of the entrepreneur and if his materials is rejected, the unit alone suffers a loss of 5 to 10 lakhs depending on the consignment. No sympathetic tear is shed by anyone.
9. The orders stipulate that the bulk suppliers should go through successful field trial. This depends on the oil field, depth, geochemical consistency. Even imported material fails in some fields and succeeds in some. There is no thumb rule for this. The site personnel should use material to suit the need. How can they fix such a condition on the material procured? They can only insist on Lab performance.

SUGGESTIONS

We feel that all efforts for developing import substitution product for oil drilling, will become futile, if proper identification of products are not done associated with the industry, and the industry is given sufficient orders and time frame to go in for production and to maintain orders and production for atleast 5 to 6 years. Without this specific allocation and assurance of orders no indigenous manufacturer can survive by supplying material to ONGC. The payment should be 100% against L.C. as they give to foreign suppliers a payment certificates should be issued within 15 days after payment. The Central Excise chapter 10 procedure requiring CT-2 forms should be removed by proper Central Excise Notification. ONGC does not recognise price escalation clause due to escalations in raw material prices and unforeseen price rises. This adds to the loss of industry and depletes interest to develop more indigenous products. Above all the ONGC attitude of 'holier than thou' should be replaced by 'one for all and all for the country'. ONGC purchase manuals is out-dated and needs additional chapters for import substitution. Their letters and orders are fully clothed in legal language. If the entrepreneur points out legalities, they are upset about it. Part of the cost of development should be given to the entrepreneur atleast after he succeeds in the development. It can be given atleast 5% extra on the supplies made over and above the tender price against the actual supplies.

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Science Briefs

CENTRE FOR COMPOSITIONAL CHARACTERISATION OF MATERIALS

The Centre for Compositional Characterisation of Materials (CCCM), now being set up at the Nuclear Fuel Complex campus in Hyderabad, is scheduled to be operational by late 1991.

The expertise for setting up this centre has been drawn from three decades of experience encompassing the competence acquired at the Analytical Chemistry Division of the Bhabha Atomic Research Centre (BARC) specially the newly set up module (prototype) of 'clean' laboratory for ultratrace analysis using indigenous technology at Trombay, according to Dr. S. Gangadharan, Head, Analytical Chemistry, BARC and also the Project-in-charge of CCCM.

The demand of the nuclear programme for pure materials gave rise to the limits of trace analysis and posed a challenge for analytical chemistry. Nuclear based analytical methods have played a pivotal role in the characterisation of materials with respect to trace constituents.

Characterisation describes those features of the composition and structure (including defects), preparation, properties or use and reproduction of the material. "The major factors for the successful application of nuclear-based analytical methods are minimal sample handling with the resultant maintenance of the integrity of the samples, freedom from reagent blanks and inherent high sensitivity for simultaneous multi-element analysis", Dr. Gangadharan added.

Among the different approaches in nuclear-based analytical methods, the one involving neutron activation has made the maximum contribution to trace analysis. This is largely due to a com-

bination of high fluxes of neutron reactivity available in the research reactors and the large efficiency high-resolution detectors and associated electronics. Analysis using MeV energy ion beams for not only impurities in the bulk but also for surface and depth profiles of impurities, complemented by nuclear based hyperfine measurements such as Mossbauer effect, positron annihilation and angular co-relation for the chemical state information complete the picture of nuclear methods.

The prototype ultratrace analytical facility (PUAF) at BARC has established attainable levels of cleanliness and is better than class 100 (100 particles of diameter greater than 0.5 micron per cubic foot) at the work surface. Dr. Gangadharan said, "the cleanliness with respect to metallic impurities has been monitored through analysis of the samples at several locations in addition to particulate counting".

The primary objectives of the CCCM will be to develop the capability to provide total compositional characterisation, evolve, validate and demonstrate analytical methodology for the determination of specific elements drawn from parts per million (ppm level) in materials and make such validated methodology available for end users.

The CCCM will also develop and validate methodology for characterisation of high purity materials with respect to impurities of interest at ultratrace levels of the analytical measurement process.

The centre with its Laboratory building occupying an area of 3,000 sq.m. surrounded by an extensive greenbelt will not be manpower intensive, according to Dr. Gangadharan. The nature of the work requires an interdisciplinary group of qualified, skilled and most of all dedicated scientists and technicians. This is very important, says Dr. Gan-

gadharan, because the quality of results depend substantially on the care and skill exercised by the staff and the attention they bring to bear on the minutest details regarding sample handling, sample preparation and other steps of the analytical measurement process, especially in ultratrace analysis.

The laboratory facility will have several modules with varying degree of metal-free cleanliness using Polycarbonate and perfluoro alkoxy material. The items like wash basin, door handles and working tables will be made of these materials. A Trace Analysis Laboratory, a Profile Measure Laboratory with major experimental facilities, a 3 MeV terminal tandem accelerator, an analytical electron microscope and an Ultratrace Analysis Laboratory and supporting facilities will be made available.

"We plan to carry out basic research in all aspects of the analytical measurement process, participate in international inter-comparison exercises to monitor the methodologies evolved and developed and also provide specialised training and consultancy", Dr. Gangadharan said.

There are also plans to provide validation support to other programmes using different analytical techniques. This role of providing validation support has also been exploited for monitoring the results in programmes of social value such as environmental and forensic sciences at Trombay. "The performance of the Centre will depend on the evolution of this culture of clean-room chemistry", Dr. Gangadharan said.

-- PTI Science Service.

PROTEIN CRYSTALLISATION IN SPACE

As the U.S. shuttle, Discovery, orbits overhead, dozens of on-board experi-

ments are quietly testing a process for growing protein crystals in space. Protein crystallisation has the potential, some experts say, to be the first business success story in the fledgling field of space based materials processing.

At this early stage, no one can tell whether the field will ultimately yield vast commercial profits or a stiff dose of unfulfilled hopes, but the potential has attracted the interest of leading pharmaceutical companies and academic scientists, and has even sent western researchers scurrying to the Soviets and Chinese to loft their experiments into space.

The goal of the experiments is to grow crystals big and pure enough to allow scientists who study them, back on earth, to determine a protein molecule's exact three-dimensional structure. Because proteins are essential components of all life forms, from humans and plants to viruses and bacteria, knowledge of a protein molecule's exact shape can aid in understanding the basic mechanisms of life. Such knowledge can also help scientists create new drugs or pesticides to enhance or inhibit the function of the protein.

Although protein crystals can be grown on Earth, they are often distorted because of the effects of gravity on the growing solution. Gravity can cause convection currents and sedimentation that interfere with uniform crystal growth, leading to an imperfect crystal and making images of the molecules taken by X-ray crystallography imprecise. Scientists hope that the weightlessness in space will allow them to grow bigger, more perfect crystals, although it has yet to be determined whether they will be good enough to justify the great cost of space experimentation.

Starting in 1983, scientists have tried to crystallise proteins on seven shuttle flights, with mixed results. On this shuttle flight, 60 experiments in protein crystallisation are under way, sponsored

by academic scientists and industrial giants. These experiments could improve food production and lead to innovative new drugs to combat cancer, AIDS, high blood pressure, organ transplant rejection, rheumatoid arthritis and many other diseases, says a statement by the National Aeronautics and Space Administration.

Proteins are complex molecules that are vital to life. Hormones, enzymes, antibodies, hair, skin and bones are all made of proteins. Moreover, virtually all biological functions, including diseases, are controlled by proteins. Experts say the next big step in the biotechnology revolution is to tailor-make proteins that can enhance or limit these natural processes.

The key to protein engineering is knowing a proteins shape, because that largely determines its function. A protein meshes precisely with the molecule with which it interacts, in a lock and key fit. Once the shape is known, a protein can be modified, or a new one custom designed. For instance, knowing the shape of a particular protein of a disease agent might allow the creation of a simple molecule that blocks its action. Today without knowing what a protein looks like, scientists develop drugs in a more hit or miss way.

On this shuttle mission the 60 crystal growth experiments were activated on the first day aloft and each will be turned off shortly before landing. Each experiment is activated when a drop of protein solution is mixed with a drop of precipitating agent, creating conditions in which molecular strands start to arrange themselves in an orderly fashion, creating a crystal. To minimise problems, the 60 experiment capsules are being housed in a climate control box and will be photographed less often. At the end of the flight, the crystal-laden solution will simply be pulled back in a syringe for safe keeping until it can be analysed on earth. Some experts are critical of putting crystal experiments on

manned vehicles at all, saying the inevitable man induced vibrations that crystal experiments could be eliminated on an orbiting vehicle that had no astronauts permanently on board but was visited periodically by them.

-- New York Times

ROW OVER S & T RESEARCH MECHANISM

The Department of Science and Technology (DST) and the Science Advisory Council to the Prime Minister (SAC-PM) seem to be at loggerheads over a recommendation of the latter concerning the mechanism of funding basic research in frontline areas of science and technology.

The recommendation seeks to take away the responsibility of funding and promoting the so called Thrust Area Programmes (TAPs) from the wings of the DST and bring it under an autonomous national body. At present, the Science and Engineering Research Council (SERC) of the DST, which was created in 1974, carries out identification of the TAPs, selection of projects for funding and monitoring of their progress through experts who constitute the so-called Programme Advisory Committees (PACs) for different fields.

The SAC-PM, in its November 1990 report 'An Approach to a Perspective Plan for 2001 AD: Role of Science and Technology -- Recommendations for Action', has called for the creation of a statutory autonomous National Science and Engineering Research Board (NSERB) that would become 'the prime focus for funding the basic research'.

The Board will be charged with 'the task of ensuring support for excellence and of giving a general direction to science in the country', the report says. It is learnt from sources in the DST that the SAC-PM was of the view that the Board should have an elaborate permanent executive structure' with a

Executive Director, full fledged
ard etc,

rationale questioned

These recommendations have evoked strong response from the Secretary, ST, Dr. Vasant Gowariker, who, in letters addressed to the Chairman and members of the Empowered Group set up to consider the recommendations of the SAC-PM, Secretaries of the Scientific Departments, the Chairman (Prof. C.N.R. Rao) and Members of the SAC-PM, Special Assistant to the PM and the Chairman of the University Grants Commission, has questioned the rationale for this move recommended by the SAC-PM.

Pointing out that the share of the DST in the country's total funding in S & T programmes of Rs. 2,870 crores in 1986-87 had been only about Rs. 10 crores in the form of research grants in trust area research, Dr. Gowariker is reported to have said 'The SAC-PM's concern, in its present proposal, is not in the qualitative, quantitative, distributive and futuristic aspects of the Rs. 2,870 crores that India spends on S & T programmes every year but on the mere Rs. 10 crores that the existing time-tested mechanism of the SERC gives by way of grants to catalyse the effort in science and engineering'.

1200 research projects

The SERC, according to its Activities Report for the years 1980-87, has supported over 1200 research projects since its inception, a large number of which are in academic institutions; spent all about Rs. 65 crores; covered about 100 scientists/engineers in the country and has sustained some world class individuals. The SERC members serve three-year term with the approval of the PM.

The point that Dr. Gowariker has apparently tried to make is that every eminent scientist of the country has served on the SERC or its PACs for at least two three-year terms. Therefore,

whom does this 'permanent executive structure' proposed by the SAC-PM seek to replace? Interestingly, for the period 1987-90 five of the 16 members of the SERC, whose chairman is Dr. Gowariker, have been members of the SAC-PM too.

In the opinion of the DST, the SERC has served to establish a comprehensive system of peer evaluation involving a number of eminent individuals from national laboratories, academia and industry. The system is considered unique and its professional functioning apparently has been commended by most scientists.

Instrumentation facilities

Many in the DST believe that the SERC scheme has helped young scientists benefit a lot and applied scientists in the University system do no longer feel left out from mainstream scientific activity in the country. The creation of some national instrumentation facilities through its Regional Sophisticated Instrumentation Centres (RSIC) programme, for example, is also claimed to have provided a system through which a large number of scientists from all over the country can benefit in a way basically free from bureaucracy.

Pointing out that the SERC/TAP/PAC system has functioned without any perturbations despite Secretary-level changes for about half a dozen times, Dr. Gowariker has said that this proved the basic independence of the system of the extramural funding established by the DST. According to Dr. Gowariker the existing system has also served to make DST's extramural funding a part of its own corporate activity by maintaining SERC's 'organic linkages' with DST's other programmes.

Devoid of vital links

He has expressed the opinion that the most disturbing part of the SAC-PM proposal is the creation of a new mechanism that is totally devoid of these vital organic links and isolates it in a 'per-

manent executive structure'. The proposal of the SAC-PM that this NSERB should function in a manner similar to the National Science Foundation (NSF) of the USA has also invited criticism from the DST. This, Dr. Gowariker has pointed out, overlooks the basic fact that in the US most of the R & D funding is done by the private industry, which creates, therefore, a need for governmental support to some basic research, while in India governmental funding of research is over 80%.

Further, the total R & D funding channelled through the NSF like agencies run into millions of dollars whereas the DST handles a mere Rs. 10-15 crores through a mechanism which now the SAC-PM, for some reason, wishes to replace by creating the NSERB, Dr. Gowariker is believed to have stated.

WONDER DRUG FROM PRAWN SHELLS

A substance processed from the discarded shells of prawns, lobsters and other crustaceans is poised to become a wonder drug to arrest haemorrhage and speed-up wound healing.

The substance, Chitosan, a derivative of the second most abundant natural polymer "Chitin", has been cleared for use on humans by the ethical committee of the Trivandrum medical college hospital following spectacular results in a series of animal experiments conducted during the last three years.

The experiments, conducted by Dr. M. Sambasivan, director and professor of neurosurgery in the hospital, and Dr. Radhakrishnan, pathologist in the Sree Chitra Tirunal Institute of Medical Sciences and Technology, have "conclusively proved" the haemostatic and wound-healing properties of Chitosan (pronounced Kaitosan). It was also established that Chitosan was biocompatible and that there was no side effect or reaction to its administration, Dr. Sambasivan said.

Following the ethical committee's clearance, chitosan was applied, with excellent results, on two accident victims who had excessive haemorrhage.

In both the cases, haemorrhage was arrested speedily with the application of Chitosan in powder form.

In another case, gauze impregnated with Chitosan was used as a dressing to cover ulcers which healed very fast.

Both the powder and the Chitosan-impregnated gauze were developed and made available to the hospital by the Central Institute of Fisheries Technology (CIFT), Cochin.

The CIFT is one of the many agencies in the world which are trying to exploit the magical properties of Chitin and Chitosan.

Extensive research has already been done in some countries on the use of these materials for a wide spectrum of applications in agriculture, food processing, animal and poultry feed manufacture, pharmaceuticals, biotechnology, medicine, adhesives and waste water treatment, to name only a few.

Dr. Sambasivan said while the haemostatic and wound-healing properties of Chitosan were known for long,

details on how it acted to stop bleeding, or speed up healing, were not understood. The Trivandrum experiments could establish the mode of operation of the polymer derivative.

In the animal experiments haemorrhage was induced in the brains of rabbits, and Chitosan powder applied to stop bleeding. The rabbits were then allowed to live for different periods of time and then sacrificed to study their brains.

It was found that there was no damage to the brain tissues, no scarring or gliosis, and no other side effect. In other words, Chitosan was biocompatible and could be safely applied in the brain to stop bleeding.

On its effect on coagulatory mechanism, Dr. Sambasivan said Chitosan did not interfere with either the extrinsic or the intrinsic pathway of the circulation system but acted only on the "aggregability of the platelets". That is, the platelets, which help clotting, got adhered to each other very quickly in the presence of Chitosan, he said.

Dr. Sambasivan said several other uses of Chitosan were being explored. The CIFT was trying to make a Chitosan film which could be used to cover burns or other forms of extensive skin

loss. This would help prevent, fluid loss from the exposed skin and ensure speedy healing. Chitosan film could also be used as a substitute for "dura" (a membrane covering the brain) in case of dural loss due to accidents.

These findings were presented in a paper by Dr. Sambasivan at the annual conference of the Neurological Society of India at Chandigarh in December last.

Keeping with the world-wide interest in the potentialities of Chitin and Chitosan, the MATSYAFED (Kerala State Fishermen's Cooperative Federation) has set up a pilot plant for the manufacture at Neendakara in Quilon district.

It is one of the major shrimp fishing and processing centres in Kerala, with an assured supply of the raw material—the skeletal material of shrimps discarded by the fish processing units. The end-product Chitin is converted to Chitosan which is stored in a dry, pulverised form.

The plant, inaugurated on March 30, has a production capacity of 3,000 kg a year, MATSYAFED general manager K. Appukuttan said. The technical know-how was supplied by CIFT.

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NEWS FROM ABROAD

ELF ADOPTS WHITE KNIGHT ROLE WITH PENNWALT BID

Elf Aquitaine, the French oil, chemicals and drugs major, has launched a \$1.05bn bid for Pennwalt. The proposed takeover has received unanimous support from both boards and has been described as friendly. Pennwalt has been searching for a white knight for some months to counter the hostile \$110/share bid from US investor group Centaur Partners.

The Centaur bid was due to expire recently and the investor group extended its offer deadline by another week. In a statement Centaur said: "Our tender offer for shares of Pennwalt has been extended so that we may have an opportunity to review the definitive agreement between Pennwalt and Societe Nationale Elf Aquitaine and Elf Aquitaine's related tender offer materials."

The French group is proposing to buy Pennwalt's 8m shares with a \$132/share bid. The offer opened recently and is valid for 20 working days. Elf will acquire Pennwalt through its US subsidiary Elf Aquitaine Inc using \$500m cash and the balance through credit lines and loans floated in the US.

If the Elf bid succeeds, it will end the acrimonious exchanges that have taken place between Centaur and Pennwalt since last May. Pennwalt has alleged the investment group planned to sell off Pennwalt businesses to raise money.

Centaur has denied the claim, and in a letter to the Pennwalt board has highlighted the irony of its accusation. "We intend to

build Pennwalt. Your own "restructuring" involved a much more extensive "break up" of the company than anything we have considered."

Since last year when Centaur began building up its stake to the current 12.7 per cent holding, Pennwalt has been selling off assets to make it less attractive to predators. In the most recent move the US chemicals group has sold its Pennwalt Italia subsidiary to Akzo.

The Dutch chemicals group considers Pennwalt Italia's product line and market position to be complementary with its own strategic goals. Pennwalt Italia markets methylamines and its derivatives and a wide range of accelerators for the rubber market.

Last year, Pennwalt sold its drugs business to Fisons for \$442m, its equipment business, Sharples-Stokes, to Sweden's Alfa-Laval for \$119m and last month Wallace & Tiernan to the management for \$44m.

Despite these sales Elf has proceeded to offer a price most observers believe is very high. If the deal goes through it will rank amongst the most expensive French takeovers of US firms.

Elf's purpose in acquiring Pennwalt is in line with its strategy to develop the chemicals base of the state-owned group. Chemicals currently account for about 40 per cent of Elf's total sales and, excluding Sanofi, generated profits of FF3bn (\$476m).

Jacques Puechal, chairman and chief executive officer of Elf's chemical operation, Atochem, has revealed that he wanted to impro-

ve sales from FF50bn to FF75bn by 1992/93. The Pennwalt buy will put Atochem on this track.

About one third of Pennwalt's sales are in geographic markets that Atochem wishes to develop: Latin America, Europe, and the Far East, especially Japan.

Product-wise, Pennwalt is involved in four sectors; engineering plastics, fine chemicals, sulphur, and fluorine and chlorine chemicals, areas which complement Atochem.

PHILLIPS UNVEILS PROJECT PLANS

Phillips Petroleum is planning to invest \$211m in capital projects for chemicals and plastics this year, a 50 per cent increase on last year's capital spending of \$140m. The company has also announced organizational changes to emphasize its growth businesses and improve competitiveness.

The changes due to take place at Phillips from next week include the creation of two international regions for the company's chemicals and plastics businesses: one in South Asia and another in Europe-Africa. Moreover, the firm is forming a new advanced materials unit combining the existing Ryton, advanced composites and other engineering plastics sectors.

In the longer term, John Van-Buskirk, vice president revealed that the company intends to build a polyphenylene sulphone (PPS) plant in Europe through its joint venture with Ciba-Geigy. "The plan is to have a PPS plant some time in the mid 1990s."

The company has a 7,260 ton/year PPS plant in Borger, Texas and a 3,750 ton/year unit at Nagoya, Japan, at shares with Toray Corp. The Japanese plant has the potential to have its capacity doubled.

Later this year, Phillips expects to announce plans build a European plant to manufacture its butadiene styrene (K-Resin) resins. VanBuskirk revealed that feasibility studies are currently underway and should be completed by the end of 1989. Demand for butadiene styrene resins is growing at 8 to 12 per cent/year.

EASF DETAILS KOREAN MDI COLLABORATION

BASF Japan has revealed further details about its plan to build a Korean MDI facility in collaboration with Hanyang Chemical Industries. The 40,000 ton/year plant will be built at Yeochin, with start-up scheduled for 1992. BASF says its main reason for building the plant is the extraordinary growth rates that are currently being seen in Korea.

The Far East is currently a net importer of MDI and is expected to be a faster growing market than the US and European markets. This has attracted many announced plans for additional MDI production in the Far East, according to Kenneth Kerr, Dow Chemical Pacific, who believes, however, that some of those announced plants will be delayed or possibly cancelled.

Dow is major supplier of MDI to the Korean market, primarily through its joint venture, MD Kasei. The company has been evaluating the feasibility of MDI production in Korea but has not made a decision at this time.

SANCFI INKS DEALS

Sanofi, Elf Aquitaine's health subsidiary, has concluded a series of deals to strengthen its seeds business.

In France it will take over France Canada Semences in a joint venture with a French cooperative, Union de Blois, through Sa-

nofi's seed subsidiary, Rustica. Rustica will develop Semences research centre in Champigny, France, into a major seed research site. Union de Blois has interests in maize.

In Spain, Sanofi has teamed up with the vegetable oil group, Bunge, to form a joint venture called Arlesa Semillas, headquartered in Seville. Bunge brings a sunflower seed company to the venture which will be boosted by Sanofi's biotech know-how. The firm should have sales of about FF30m (\$4.76m) in its first year.

Sanofi also increased its holding in Groupement Agricola Essoncis to a majority, when the latter bought Societe Gambier, a French seed producer.

ICI SELLS STAKE

ICI Colours and Fine Chemicals has sold its 40 per cent stake in the Spanish pigments firm, Intermedics Organicos SA (INTORSA), to Tokyo-based Dainichisei-ka Colours and Chemicals Manufacturing Co. The UK chemical firm refused to disclose terms.

ICI wants to strengthen its international pigments business by channelling investment to the production of azo pigments at its French subsidiary, Francolor. The firm said a separate base in Spain was no longer needed, after Spain joined the EEC.

ICI AUSTRALIA POLLUTION CHARGE

In Australia, ICI is facing pollution charges over alleged excessive discharges of mercury from its chloralkali plant at Botany Bay, New South Wales. According to reports the Australian environment minister has accused the company of pumping mercury into Sydney's sewerage system at rates of up to 12 times greater the

accepted level during the month of February.

Regulations set a standard of 0.1 ppm mercury in effluent discharged. According to ICI Australia, annual average mercury discharge levels have been 0.093, 0.09 and 0.066 ppm over the last three years. While daily levels rose above the yearly average in February the firm says that the annual figures remains inside emission requirements.

Australian press reports say that the environment minister is looking to enforce legislation more vigorously in the future.

Meanwhile, in the UK, ICI is facing pressure from financial circles to detail plans for pollution abatement. Investment organizations, which have billions of pounds tied up in UK industry, are planning to examine the impact of key companies' operations on the environment.

ADVANCED VACUUM WEB COATING OF PLASTIC FILMS

The vacuum system designer LEYBOLD has constructed a new vacuum web coater for production of multilayer coatings, including oxides, in a single pass.

The applied vacuum coating process is high rate sputtering and plasma enhanced chemical vapour deposition.

6 coating sections, 5 for metallic or reactive sputtering and one for chemical vapour deposition, permit either high production rates for single material layers or short cycle times for complex multilayer coatings. Sputter coated plastic films can be used e.g. for flexible printed circuit boards, membrane-switches, touch panels, heatable transparent films.

The sputter vacuum web coater is currently available for contractual development work.

Technological Scene Abroad

DU PONT TO SCALE UP NYLON 12/12 OUTPUT

Du Pont has started producing nylon 12/12 in semi-commercial scale quantities in the US and Canada, and anticipates commercial quantities will be available in the third quarter of 1989. The engineering resin was first made in 1988 at the firm's Maitland, Ontario facility. After further development and market evaluation, existing plants at Chattanooga, Tennessee and Kingston, Ontario will be used to produce the new material.

Although much depends on market development, Du Pont says it will produce quantities in the range of several millions of pounds/year over the next three to five years. This output can be met from the Chattanooga and Kingston plants, which the company uses to make a whole range of polyamides.

The polymer is made by reacting 1,12 dodecanediamine and 1,12 dodecanedioic acid. The acid is sourced from Du Pont's Victoria, Texas, facility, while the company's Maitland site is capable of converting the acid to the amine.

Falling into Du Pont's Zytel polyamide range, the nylon is resistant to chemicals and hydrolysis and is also flexible at low temperatures. The US firm expects further development work will show that nylon 12/12 has other useful properties.

Du Pont says the material can be used in molding, extrusion and powder coating applications. Potential markets include automotive, where the polymer can be made into intricate car parts.

The US company estimates world demand for this resin type is about 36,300-40,800 tons/year, and forecasts growth will run between 10-12 per cent/year. Du Pont says it has sufficient capacity in the US and Canadian plants to meet its market expectations.

While the company is already talking to customers in various countries, initially it will focus on the North American markets. However, in the long term it will expand into the Asia Pacific and European markets. It predicts that in three years it could have facilities for tailoring and compounding the material in these regions.

There are three types of the nylon 12/12 material. These are glass filled, heat stabilized and plasticized. Within these three classes, there are various grades. The materials will be marketed by Du Pont's industrial, consumer and automotive businesses.

Du Pont will compete against Atochem, Huls, Emser and Ube with its new engineering product. France's Atochem is strong in nylon 11 and 12, dominating the market in 11, while West Germany's Huls is a major player in the nylon 12 and intermediates market. According to Du Pont, the European market is well developed and the company does not expect high growth in this region.

Meanwhile, Du Pont has announced plans to build an ethylene vinyl alcohol resins plant at La Porte, Texas, US. The 18,150 ton/year unit should be on stream in 1991.

PHILLIPS 66 EXPANDS NEOHEXENE CAPACITY

Phillips 66 is planning to expand production of neohexene in the US and Europe. The compa-

ny's production plant at Pasadena, Texas, will be debottlenecked during the year to produce millions of pounds/year quantities. While future plans include construction of a neohexene facility at Philtex European's speciality chemicals plant at Tessenderlo, Belgium in the 1990s.

Neohexene is used as an intermediate in the production of polycyclic musks for the fragrance sector. Phillips 66, which claims to be the world's only producer, has its own proprietary technology, known as metathesis or olefin disproportionation.

The US firm estimates neohexene demand worldwide is around 2,250 ton/year. Growth demand for the product is around 10-12 per cent, and follows that for polycyclic musks. Despite higher prices these synthetic musks are finding increased use in markets traditionally served by nitromusks because of superior performance and lower toxicity. A key use of polycyclics is in aroma chemical formulations for household detergents.

TEXACO TO DOUBLE ETHYLENEAMINE UNIT

Texaco Chemical plans to more than double ethyleneamine production capacity at Conroe, Texas, US to 18,150 ton/year. The unit currently produces ethylenediamine, diethylenetriamine and a small amount of piperazine.

Expansion will increase output of these lines and allow production of triethylenetetramine and tetraethylenepentamine. The products are used in the manufacture of lubricant additives, textile treatment chemicals, and surfactants.

The expanded facility will use proprietary technology developed by Texaco Chemical. The unit will be completed in the first half of 1990.

News About New Projects

REPSOL PLANS GRASS ROOTS COMPLEX AT CARTAGENA

Repsol, the Spanish state-owned oil refiner and petrochemicals concern, plans to build a grass roots ethylene cracker as well as downstream units at Cartagena on the country's south east coast.

Javier de la Pena, Repsol Quimica's president, has confirmed that the company is studying a flexible cracker for completion by 1994.

Speaking at the recent Forum Europe, US and Asia, de la Pena said that Repsol currently produces 600,000 ton/year of the feedstock and on completion of the new facility will have in excess of 1m ton/year of capacity. This will put it on a par with other major producers in Europe. The company already buys 70,000 ton/year of ethylene for its downstream operations and will need more feedstock in the future.

Cartagena will become Repsol Quimica's fourth manufacturing site in Spain. At present it has facilities at Puertollano, Santander and Tarragona. Recent acquisitions have also added sites near Cadiz and Madrid.

"We have a refinery and a port there, General Electric is coming (to Cartagena) and being a domestic producer it is natural for us to go there", de la Pena said. A joint venture could be a possibility.

Repsol operates two crackers at present. At Puertollano it runs a 220,000 ton/year unit and at Tarragona a 380-400,000 ton/year facility. The company was unsuccessful in its joint bid with Dow to acquire the Epsi operations in Portugal and undoubtedly feels it

needs to strengthen its position in Europe.

Last year Repsol made five acquisitions including a carbon black manufacturer at San Roque, near Cadiz, an unsaturated polyester resins plant near Madrid and a 25 per cent stake in the Catalan PVC manufacturer, Aiscondel. Also at the end of the year it bought two polymethyl methacrylate producers in Italy and Denmark, now named Repsol Polivar and Repsol Bronderslev respectively.

The company, de la Pena pointed out, will not stop there. A new deal which involves the pooling of a specific business in Spain is about to be concluded. After that Repsol needs to do "something big in Europe" before venturing to North and South America. The Far East will come after that.

De La Pena also confirmed that Repsol Quimica is looking at entering the polystyrene production market. The company has a 110,000 ton/year styrene monomer plant at Puertollano which supplies feedstock for its 60-65,000 ton/year synthetic rubber plants. The 90,000 ton/year surplus capacity is sold on the merchant market.

In January Repsol started up its 100,000 ton/year polypropylene plant at Tarragona. The facility, a 50-50 joint venture between Repsol and Hoechst, started up on time, within budget, and has already exceeded the nameplate capacity. It is based on Himont's Spheripol process.

Cartagena is the site of a 6m ton/year refinery belonging to Repsol and a large fertilizer complex run by Enfersa. Attracted by government incentives, General Elect-

ric Plastics announced last September that it will spend \$1.7bn on its second European production complex at Cartagena.

Repsol's cracker will add to a growing number of new ethylene production facilities planned in Europe. BP Chemicals plans to double capacity at Grangemouth in Scotland. Although not yet approved, the project is very alive, Bob Malpas, managing director of BP told ECN. "It's an add-on at the front-end, more than half the plant is already in place. It's linked to North Sea ethane and condensates, it's a natural", the managing director said.

Antonio Lorenzo Necci, president of Enimont, said that the company is going ahead with the Brindisi cracker, which is already in design phase, for completion by 1991. TPL has the basic design contract.

Other plants planned in Europe are the Finaneste plant at Antwerp, a new Veba cracker at Gelsenkirchen and a doubling of the Dunkirk cracker by Orkem. Dow is mulling a 700,000 ton/year plant at Terneuzen and ICI is contemplating the restart of an idled 400,000 ton/year plant at Wilton.

LITWIN AWARDED \$50M SOVIET CONTRACT

Litwin SA has won a contract valued at \$50m for the supply of a 30,000 ton/year thermoplastic styrene-butadiene elastomers plant at Voronezh in the USSR. The contract, signed with the Soviet foreign trade organization Techmashimport, covers the supply of technology, know how, equipment, training of personnel and supervision of construction and commissioning, planned in 1991.

Profina, research centre of the Profina group, in conjunction with Fina Technology Inc, the leading unit of American Petrochemicals has granted the technology licence.

The contract will be financed in part through a pool of banks led by Banque de l'Union Européenne. Following Litwin's recent order covering the development of the Tenghiz oil and gas field, the new contract consolidates the Dutch contractor's position on the Soviet market.

Litwin is the French affiliate of Canada's AMCA International whose main shareholder is Canadian Pacific.

The Petrofina group operates a plant producing this type of thermoplastic elastomers in Antwerp, Belgium, with a current capacity of 60,000 ton/year. A new 20,000-ton/year line producing specialty products is currently being commissioned.

HOW TO BUILD MAJOR PS PLANT AT TESSENDERLO

Dow Chemical, currently Europe's second largest producer of polystyrene, is to build a major plant at its Tessenderlo, Belgium. The project, which will more than double Dow's capacity at Tessenderlo, forms part of the US producer's recently announced \$1.1 billion European investment plan to 1991.

The new facility will be designed to produce 90,000 ton/year of styron general purpose polystyrene, adding to the existing 75,000 ton/year capacity at the site.

Dow's other European general purpose/high impact polystyrene plants are located at Lavrion, Greece (25,000 ton/year), Livorno, Italy (65,000 ton/year), Terneuzen, the Netherlands (85,000

ton/year), AXP Erandio, Spain (45,000 ton/year) and Barry, Wales (60,000 ton/year).

On completion in 1992, the new facility will bring Dow's total capacity to 445,000 ton/year. This could put Dow close to BASF, Europe's current leader, which has capacity for 480,000 ton/year.

Europe's other general purpose PS producers, in order of rank, are Atochem, Enimont, Orkem and Huls.

Dow's expanded polystyrene (EPS) capacity is relatively small. The company makes in the region of 3,000 ton/year at its Greek and Spanish locations. BASF is Europe's number one EPS producer followed by Shell, Enimont and Orkem.

Dow will be well provided for styrene monomer feedstock. It is raising its European capacity, all located at Terneuzen, to 950,000 ton/year through the expansion and revamping of existing capacity. The company currently operates three styrene monomer lines. Lines number one and two are being raised to 450,000 ton/year while the third, a 500,000 ton/year facility, stays in place.

HIMONT APPROVES TWO NEW PLANTS

Himont's Board of directors has approved construction of two new plants in North America. At Bayport, Texas, US the company will build an 80,000 ton/year facility incorporating its Catalloy multi-component catalyst and monomer technology to make a wide range of engineering resins and elastomers.

The plant, due on stream by the end of 1990 will be similar in design to a facility announced last year (ECN May 23, 1988) at Ferrara, Italy, complex. The products

bear no relation to polypropylene (PP).

At Varennes in Canada, Himont will use its technology to make 65,000 ton/year of PP-related polymers with "unique processing properties." This, the company says, will open up new markets for PP in sectors such as flexible and rigid packaging, fibres and consumer products. Completion of the Canadian plant is also due by the end of 1990. It will be the first facility dedicated to commercial production using the new technology, details of which the company declined to reveal.

Varennes was selected because of its strategic location, being close to North American markets and the availability of government incentives.

In announcing the projects Himont's chairman and ceo Al Giacco, said the company will invest \$1.6bn of internally-generated funds over the next four years to accelerate strategy to transform Himont into a world-wide material technology company. Investments will be made in three different directions: value added advanced materials; global growth; and cost reduction. Research has produced even more significant new catalyst system enabling the company to achieve new processes and products to the extent that Himont can generate projects sufficient to build the company to over \$4bn in sales in the next four to five years, Giacco said.

Michael Hendricks, president and chief operating officer, said that the company has formalized its material substitution programme and has identified applications representing 2m ton of business potential where segments now served by other materials can be covered by polypropylene.

Biotechnology

BBL CASH DRIVE, PLANS COLLABORATION DEALS

British Bio-Technology (BBL), the fast growing UK health science company, is planning to raise further capital through private share issues in Europe and Japan in April. The Oxford-based firm is aiming to raise around £30m (\$52m). The funds will be used specifically for new drug development and to support research.

BBL has also signed a licensing agreement with SmithKline Beckman to develop and commercialize novel collagenase inhibitors for treating arthritis. The two firms will work on potential orally active anti-arthritis drugs. SmithKline will fund and manage the clinical trials of collagenase inhibitors.

If successful, the US company will make the new agents worldwide with BBL retaining co-marketing rights throughout Europe. The UK concern will also receive royalties on all SmithKline sales.

BBL plans to grow into a key player in the worldwide pharmaceuticals market, and has a number of drugs in development phase. The company anticipates further collaboration deals, similar to the SmithKline agreement, to bring products through costly clinical trials and into the market. Negotiations with potential partners are underway.

According to BBL its new therapeutics should be available by the mid to late 1990s.

The firm already has four licensing agreements with third parties deal with SmithKline. BBL has another agreement with the US company in the field of blood clotting drugs.

Other deals are with Johnson & Johnson in the area of cholesterol lowering preparations, Pfizer in endothelial biology and Abbott Laboratories for diagnostics.

SPECIALITY SUGAR VENTURES

Meiji Seika, a leading Japanese confectioner, is teaming up with sugar producer Beghin Say to produce and market a new artificial sweetener in France. Initially a Yen10m (\$77,000) joint venture firm BMI will be set up in Paris to produce fructo-oligosaccharide for animal feed. In the future, the product will be made for human consumption.

BMI anticipates sales will eventually reach Yen2bn/year in European and Scandinavian markets.

The Japanese firm set up a similar joint venture in the US last year with Coors Biotech in Westminster, Colorado.

Meanwhile, ICI's Biological Products division has signed a collaboration agreement with Pfanstiehl Laboratories of Chicago, Illinois, a manufacturer and supplier of speciality sugar and biochemicals for use in pharmaceutical, agrochemical and diagnostic sectors.

The move is designed to boost ICI's world ranking in biochemicals.

MTC DETAILS U.S. INVESTMENTS

Japan's Mitsui Toatsu Chemicals is studying a grassroots amino acid plant in the US. The firm's US subsidiary MTC America is currently looking for a location and anticipates it will take a couple of months before further details are worked out. It is pos-

sible the unit will be built in Indiana, where the company's speciality business Anderson Development has a manufacturing base. As well as producing amino acids, such as L-tryptophan, arginine and cystine, MTC America also reported to be planning to make monomers for plastic leucines and toners for pressure sensitive papers.

According to MTC America plans for the amino acid unit are at a preliminary stage, but it is possible the project will be set up as a joint venture. However, negotiations with a partner for MTC says it will go ahead with the project alone. The firm believes the unit will be on stream within two to three years.

MTC America was set up last year following the acquisition of Anderson Development. The American, Michigan-based firm formed MTC's first major foothold in the US market. Prior to the acquisition Mitsui Toatsu's US sales stood at \$30m/year. With Anderson, turnover at the end of last year reached \$50m. Now the firm says it could invest around \$100m over the next two to three years depending on opportunities.

Anderson Development's main business centres around styrene-butadiene resins and polyurethane prepolymers. MTC's overall strategy in the US is to develop its speciality urethanes and polymers, doubling its business from Anderson, which currently stands at \$20m/year.

Last year MTC America initiated a joint venture with ICI in the toner resins sector. While a specific manufacturing site has yet to be named, MTC says it will be in the mid West. The investment will be in the \$20-30m range, with the plant coming on stream in two years.

NEWS FROM JAPAN

Asahi Chemical Industry Sets up New Company for PAN Carbon Fiber

Asahi Chemical Industry has established a new company named Fuji Carbon Fiber to conduct integrated production and sales of PAN (polyacrylonitrile)-based carbon fiber and carbon composite using it. The new company (capital: Y1 billion) started functioning on April 1. It is said that it was established to integrate the related businesses of Asahi Kasei Carbon Fiber and Asahi Composite, both of which were subsidiaries of Asahi Chemical Industry and were dissolved on April

Asahi Chemical Industry is not only a manufacturer of acrylic fiber — source material for PAN-based carbon fibre — but also a resin maker producing various kinds of engineering plastics and epoxy resins. The company has been conducting composite-material business via the said two affiliates. Asahi Kasei Carbon Fiber (capital: Y2 billion) produced and sold carbon fiber, while Asahi Composite (Capital: Y3 billion) and its 50/50 joint venture Ciba-Geigy (Switzerland) — was engaged in production and sales of prepreg fabrication.

The new company — owned 100% by Asahi Chemical Industry — will produce carbon fiber at its Fuji factory (Shizuoka Prefecture) and prepreg/fabrication at the Moriyama factory (Shiga Prefecture). It will increase its production capacity for carbon fiber from 300 to 450 t/y by the end of this April and intends to

concentrate on enlarging its businesses in the fields of sporting goods/leisure products, which are said to account for a major share of the domestic demand for carbon fiber, and industrial parts, a new application field, for the time being. The sales target for the initial year is set at about Y1.5 billion. It will be doubled to Y3 billion three years hence.

Synthetic Dye Supply Map Undergoing Changes

The world supply map for synthetic dyes is experiencing great changes. The biggest reason is the loss of competitiveness by companies in Europe and the United States of large-scale investments in projects aimed at preventing environmental pollution. Dyes can be regarded as the foundation for the development of organic chemistry. Technologically, too, they have been playing the role of key technology in the development of medicines and various fine chemicals. With regard to supply of synthetic dyes, European manufacturers, such as BASF and Bayer of West Germany, have been displaying overwhelming strength. At present, however, Japan — which poured enormous funds into projects aimed at preventing environmental pollution and which has great supply capacity and a high technological level — and China and the newly industrializing economies (NIEs) of Asia — which can rely on low labour costs — are emerging as important bases for production of synthetic dyes. This year is likely to mark a turning point in the world's supply of synthetic dyes.

It is the textile industry which buttresses the dye industry. The dye industry, which is susceptible to business trends, was seriously affected by a recession. Six companies have been leading the world's dye industry; Sandoz, Ciba-Geigy, ICI, and the so-called Big-3 West German manufacturers BASF, Hoechst, and Bayer. At present, however, these six are being forced to pour enormous funds into projects aimed at preventing environmental pollution, because of the problem of contamination triggered by a recent accident in the upper reaches of the Rhine. Some companies are even planning to transfer their production bases. As a result, their production costs have increased drastically.

On the other hand, the United States has been importing major materials from Europe. Because of the weakening of the dollar against other currencies and the oversupply trend, however, some major manufacturers such as Allied Chemical and GAF, have withdrawn from the dye industry during the past decade. As a result, the United States is currently dependent solely on the supply from European manufacturers. Like Europe, the States is annoyed by the problem of environmental pollution. As a result, supply capacity has declined.

Reflecting such circumstances in Europe and the United States, Japan, China and the NIEs have slipped into the spotlight. Japan laid out enormous funds in the decade from 1975. She is looked upon as a model country which has succeeded in taking effective countermeasures against pollution. Also, she has already completely recovered the funds she used. Furthermore, she is making use of the dyeing technology she has developed over a long period,

for application to nontextile fields centered on so-called information recording materials. As a result, she has succeeded in developing her dye industry as an industry that can endure changes in the economic environment. In the case of China and the NIEs, labor costs are low. These countries will not be annoyed by rises of production costs due to investments in environmental protection measures as made by European and American companies. The textile industry is a key one supplying the "coverings" essential to human life. Dyes aid this industry, and are indispensable to it. So great expectations are placed on the stabilization of supply of dyes.

Daicel to start sulfur chemical enterprise on extensive scale

Daicel Chemical Industries started last year the construction of facilities for manufacturing thioglycolic acid, with an annual production capacity of 4,000 tons, as part of its policy of strengthening enterprises related to methanol-process acetic acid. The facilities costing a little more than Y 1 billion and located at the company's Aboshi Plant (Himeji City, Hyogo prefecture) were completed towards the end of last month and have gone into operation. Japan is almost totally dependent on European and American manufacturers for her supply of thioglycolic acid. Daicel Chemical Industries will advance into the sulfur-chemical business field, taking advantage of its superior position as an enterprise self-sufficient in raw materials.

Thioglycolic acid is used as a material for vinyl-chloride-resin stabilizer, permanent waving, medical intermediates and processed

animal-source textiles. Domestic demand for the acid amounts to about 1,500 tons a year. That is Southeast Asia, including ROK and Taiwan, amounts to 1,000 tons. Buttressed by the brisk demand for vinyl-chloride resin, the demand for thioglycolic acid has been increasing at the rate of 4-5% a year.

On the side of the suppliers, such companies as Atochem of France and E. Merck and Bruno Block Chemische of W. Germany have started production on a commercial basis. In reality, Japan relies on imports for the total quantity it needs.

Daicel Chemical Industries can turn out all main materials for thioglycolic acid, such as monochloro acetic acid, high purity sulfur and hydrogen gas, at Aboshi Plant. This company is in a very advantageous position from this point of view, and demand for vinyl-chloride stabilizer and other related products is expected to increase hereafter. There are only a few rival manufacturers in the world. It is said that Daicel Chemical Industries has decided to start the production of thioglycolic acid on a commercial basis, having given full consideration to these circumstances.

Synthetic Vitamin B12 Enzyme Developed For 1st Time : Univ.

Professor Y. Murakami of Kyushu University has succeeded in artificially producing a vitamin B12 model complex and an apoenzyme model. This is said to be a world first.

The new artificial enzyme has proved to act as a catalyst in isomerizing aspartic acid into glutamic acid as well as bringing about the ring enlargement which does not take place in the living

body. It was previously considered impossible for any artificial enzyme to have such actions.

He earlier succeeded in developing an artificial vitamin B6 zyme. His staff members also successful in converting a no acid into serine, and serine into tripto acid — a biologically active substance currently attracting attention.

Vitamin B12 is the only coenzyme forming a metal-carbon bond in the body and developing various catalytic functions. Combining particular opoenzyme is an enzyme lacking a cofactor and so does not work efficiently as a catalyst by itself in many cases.

In a system using the new zyme, (1) reactions produced by the enzyme acts as a catalyst, like conventional model reactions which help only to initiate the cleavage of an alkyl complex and (2) alkanes are used as a substrate, unlike in conventional methods where a substrate is activated by halogenation etc.

Tsurumi Soda Co. to Sell Inorg., Org. Chemicals

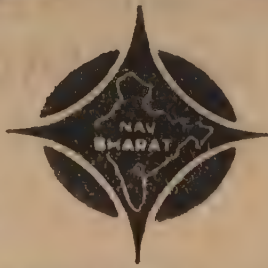
Tsurumi Soda Co. will import and sell inorganic and organic chemicals in order to expand its business by handling products other than the soda products which are its main items.

The company is planning to import goods from countries in the East Asian region such as China and Taiwan.

Exactly which items are to be imported is now under review. The company intends to import products of type not manufactured by itself and supply them at prices below those of Japanese-made products. The importing and selling will start at the beginning of next year.

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CHEMICAL WEEKLY

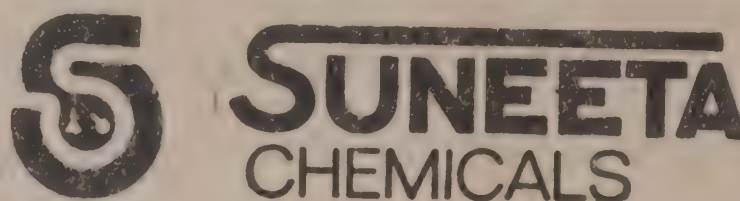
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2. Polyethylene Oxide, Alkylphenyl Ether	600 kgs.
3. EDTA-4Na	200 kgs.
4. Ferrous Sulphate (Heptahydrate)	600 kgs.
5. Sodium Formaldehyde Sulfoxylate	600 kgs.
6. Magnesium Sulphate (Heptahydrate)	30,000 kgs.
7. Phosphoric Acid (75%)	1,000 kgs.
8. Tris Nonyl Phenyl Phosphate	2,000 kgs.
9. Ethylene Bis Stearamide	600 kgs.
10. Calcium Stearate	600 kgs.
11. Magnesium Stearate	600 kgs.
12. Stearic Acid	600 kgs.
13. Zinc Stearate	600 kgs.
14. Caustic Soda	600 kgs.
15. Potassium Hydroxide	4,000 kgs.
16. Tetra Sodium Pyrophosphate	1,200 kgs.
17. Magnesium Oxide	600 kgs.
18. Silicon Oil	600 kgs.
19. Magnesium Silicate (Hydrous)	600 kgs.

Please send the details to:

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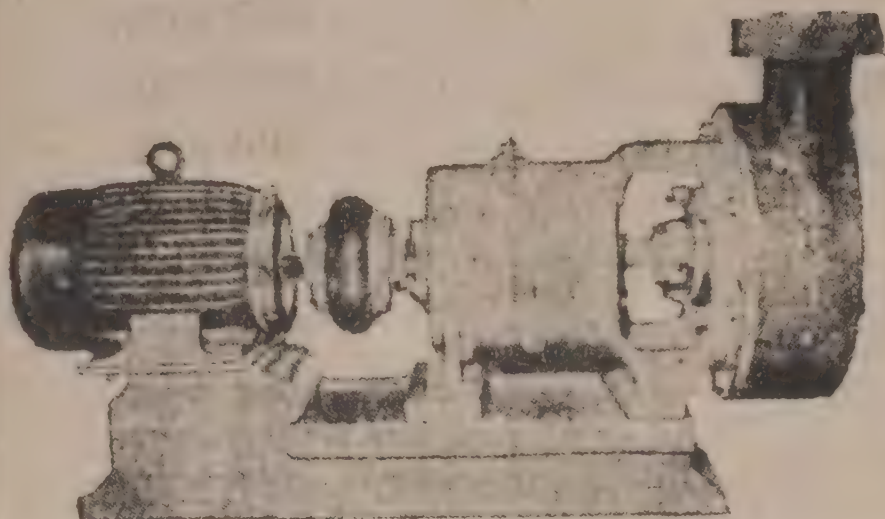
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MARKET INFORMATION

Caustic Soda, Phenol Up

Manufacturers raised prices of caustic soda pushing flakes to Rs. 14, solid to Rs. 10 and lye to Rs. 7. Acute shortage pushed up prices of sodium alginate to Rs. 250 per kg. Titanium dioxide went up by Rs. 17 per kg for anatase and Rs. 15 for rutile grades. Lack of ready material pushed up prices of phenol by Re. 1 per kg. Acetone

also went up by Rs. 1.50 per kg. In the dye intermediates gamma acid went up to Rs. 190 following new prices announced by Atul Products. Non availability of raw materials for manufacture saw para amino azo benzene prices pushed to Rs. 190 per kg. New prices for dyes have been announced. (Pl. refer the relevant section).

We cannot guarantee the accuracy of the prices published in **CHEMICAL WEEKLY** as they are based only on the enquiries made by our correspondent —and, as such they are not **FIRM PRICES** as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on May 2, 1989)

INDUSTRIAL CHEMICALS	Per Kg.				
Ammonium sulphate	2.00	Borax (Granular)	15.00	Cobalt oxide	280.00
Ammonium phosphate (Mono)	14.50	Borax (Powder)	15.25	Cresylic acid	45.00
Ammonium phosphate (Di)	12.00	Boric acid (Tech)	23.00	Camphor (Indian)	105.00
Ammonium carbonate (Di)	17.00	Bisphenol-A	70.00	Cream of Tartar (Tech.)	70.00
Ammonium bicarbonate	5.60	Butyl carbitol	50.00	Citric acid (Belgium) (Resale)	50.00
Ammonium chloride	3.00	Caustic soda (Flakes)	14.00	Citric acid (Indian) (Resale)	51.00
Ammonium nitrate	6.50	Caustic soda (Solid)	10.00	Copper sulphate	24.00
Benic white powder	23.00	Caustic soda (Lye)	7.00	Chromic acid	61.00
Acrylamide (Resale)	72+ST	Calcium chloride 70% (Solid)	3.25	Ethylene urea	58.00
Barium carbonate	6.00	Calcium chloride 75-80%(fused)	3.50	Ferric chloride (Lumps)	5.50
Bleaching powder (33% Cl)	4.20	Calcium chloride 36% (Anhydrous)	5.00	Ferric chloride (Anhydrous)	16.00
		Calcium carbonate (precipitated)	4.25	Glue flakes	15.00
		Calcium carbonate (Activated)	4.75	Glue sheets	6.75
				Gohsenol GH-17	115+ST
				Hydro	40+ST

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Hyflosupercell	18+ST	Sodium sulphide 58-60% (Flakes) (TCL)	20.00	Butanol	3
Hexamine (Resale)	34.00	Sodium sulphide pure (Flakes)	12.25	Benzyl Alcohol	6
Industrial Wax	25.00	Sodium nitrite (Resale) per 50 kg.	680.00	Benzyl Chloride	3
Litharge	40.00	Sodium chlorite 80% (Spain)	88.00	Benzo trichloride	2
Lead Acetate (Tech.)	31.25	Soda Ash (Tata)	5.00	Benzoyl chloride	8
Lithopone	18+ST	Soda Ash (Birla)	4.50	Bromine Liquid	1
Magnesium chloride (Crystal)	1.25+ST	Soda Ash (Imp.)	4.00	Chloroform	3
Menthol crystal (Flakes)	900+Ex+ST	Sodium bicarbonate	7.50	Carbon Tetrachloride	2
Menthol bold	665+Ex+ST	Sodium bisulphite	4.50	Cellosolve	50
Menthol crystal cold	700+Ex+ST	Sodium silicate	3.00	Cyclohexanone	5
Magnesium carbonate (Japan)	16.00	Sodium acetate	5.00	Cyclohexanol	1
Magnesium carbonate (Indian)	18.00	Sodium alginate	250+ST	Diacetone (Resale)	3
Maleic Anhydride (Resale)	37.00	Titanium Dioxide (Anatase)	90+ST	Diethyl Oxalate	3
Mercury (175 lbs)	13,000.00	Titanium Dioxide (Rutile - RCR ₂)	105+ST	Diethyl glycol (DEG)	42
Nickel chloride	110.00	Tartaric acid	102.00	Dioctyl Phthalate	4
Oxalic acid (Resale)	24.00	Trisodium phosphate	5.50	Diallyl Phthalate	5
Peppermint oil (Rectified)	195+Ex+ST	Thiourea	80+ST	Dimethyl Phthalate	2
Potassium carbonate (Indian)	24.00	Urea (Tech.)	2.90	Dioctyl Adipate	5
Potassium carbonate (Imported)	24.00	Vacuum salt	1.00	Dibutyl Adipate	4
Potassium bichromate	27+ST	Zinc Dust	32.00	Dipentene	1
Potassium phosphate (Mono)	14.00	Zinc Oxide	50.00	Dimethylamine 40%	1
Potassium phosphate (Di)	14.00	Zinc chloride powder (Tech.)	12.50	Dimethylamine 50%	1
Polyvinyl alcohol (No. 117)	120+ST	Zinc sulphate	7.00	Ethyl Acetate	2
Polyvinyl alcohol (No. 173)	140+ST			Ethyl Acrylate	6
Polyvinyl alcohol (No. 208)	150+ST			Ethylene Dichloride	1
Paraformaldehyde (Resale)	22+ST	SOLVENTS	Per Kg.	Ethylene Glycol	46
Phthalic anhydride 36% (Resale)	29.00	Acetic Acid Glacial (Resale)	15.50	Formic Acid (Imp.)	28.00
Pentaerythritol (Resale)	45.00	Acetic Anhydride (Resale)	33.00	Formaldehyde (Resale)	
Paraffin wax	16+ST	Acetone (Resale)	16.50	Glycerine (CP)	5
Rangolite (German)	80+ST	Adipic Acid	57.00	Glycerine (IW)	5
Rangolite (Czech.)	60+ST	Aceto Acetanilide	55.00	Hydrogen Peroxide 50% (Resale)	2
Sodium sulphate (Fine)	6.00	Aniline Oil	60.00	Isopropyl Alcohol	2
Sodium sulphate (Coarse)	5.00	Benzoate Plasticiser	62.00	Isobutyl Alcohol (Resale)	3
Sodium sulphide 50-52% (Flakes)	11+ST	Butyl acrylate	83+ST	Monoethanolamine (Resale)	6
		Butyl stearate	35.00	Melamine	80
				Methyl Ethyl Ketone	4
				Methyl Isobutyl Ketone	4
				Methyl Acrylate	4
				Methyl Dichloride (Resale)	2

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Carbitol	60+ST
Meta Cresol	45.00
Nitrobenzene	30.50
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	37.00
Propylene Glycol	52+ST
Polyethylene Glycol (No.200)	52.00
Polyethylene Glycol (No.400)	54.00
Polyethylene Glycol (No.500)	42.00
Polyethylene Glycol (No.1600)	14.00
Polyethylene Glycol (No.4000)	38.00
Polyethylene Glycol (No.6000)	50.00
Para Cresol	40.00
Styrene Monomer	43.00
Sorbitol	16.00
Sulphuric Acid	2.80
Trichloroethylene	29.50
Triethanolamine (Resale)	58.50
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	47.50

SOLVENTS Per Litre

Benzene	9.75
N-Heptane	10.50
N-Hexane	12.00
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	17.50
Xylene	17.50

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	180.00
Aceto Acetic Ester (Methyl)	64.00
Ammonium Molybdate	220.00
Anthraquinone	125.00
Anthranilic Acid	75.00
2-Amino 4-Nitrophenol	135.00
Blue B. Base (Local)	265.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	96.00
Bromamine Acid	460.00
BON Acid	130+Ex+Ta
Chicago Acid IRS	330.00
Coach Acid	58.00
C. Acid (Imp.)	190.00
Cyanuric Chloride	140.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	73.00
Diethyl Aniline	170.00
Diamino stilbene	
disulphonic acid	160.00
3,3-DCB (Imp.)	150.00
Gamma Acid (Atul)	190.00
H. Acid (Atul)	155.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	300.00
J. Acid Urea	365.00
K. Acid	115.00
MPDS (German)	185.00

MNA	115
Meta Ureido Aniline	200
MPD (Local)	205
MPD (Japan)	240
Naphthenic Acid	20
N-Methyl J. Acid	490
N-Methyl Aniline	120
Naphthalene (Refined)	24
Ortho Arisidine (OA) (Imp.)	115
Ortho Dichloro Benzene (ODCB)	14
OT Base	115
Para Dichloro Benzene (PDCB)	2
Para Anisidine (PA local)	140
PNA	95
Para Cresidine (Imp.)	370
Para Amino Azo Benzene (India)	190
PNCB	41
Para Amino Acetanilide	155
1-Phenyl 3-Methyl 5-Pyrazolone	135
Phenyl J. Acid	325
Para Amino Benzoic Acid	170
PT Base	150
Rhoduline Acid	525
Resist Salt 80%	26
Resorcinol	185
Sodium Naphthionate	67
5-Sulpho-Anthranilic Acid	77
Sulphanilic Acid	48
Sulpho Tobias Acid	150
Trichloro Benzene (TCB)	20
Tobias Acid	145
Metanilic Acid	62
MTD	120

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Bombay Dyes Market

Prices as on April 28, 1989

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange ILY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHR5	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85

Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60

Red 2B	41
Red FB	42
Red Violet FBL	622
Orange 3R	254
Violet 3R	370
Violet RL	355
Violet 6R	638
Scarlet RR	283
Rubine 3B	289
Rubine CB	449
Blue GL	419
Blue BGF	805
Navy Blue RE	359
Brown 3REL	272
Black GEL	420
Dark Brown 3B	411

BASE COLOURS	Per Kg.
Fast Yellow GC	77
Fast Orange GC	128
Fast Scarlet R	198
Fast Scarlet RC	128
Fast Scarlet RCR	105
Fast Scarlet G	115
Fast Scarlet GN	92
Fast Scarlet GG	77
Fast Scarlet GGS	73
Fast Red B	233
Fast Red RC	115
Fast Red R Flakes	158
Fast Red TR	181
Fast Red TR Oil	223
Fast Red RL	251
Fast Red KB Oil	251
Fast Bordeaux GP	236
Fast Garnet GBC	103
Fast Violet B	548
Fast Blue BB	566

NAPHTHOL COLOURS	Per Kg.
ASG	301
AS	205
ASSW	375
ASBS	251
ASBO	261
ASD	201
ASOL	241

R	369.00	Blue H-FRD	305.80	Brill. Purple 2R Hly Conc.	744.25
H	336.05	Navy Blue H3R	333.75	Brill. Purple 4R Supra Disp.	604.25
	236.00	Blue H 5RX	286.20	Brill. Purple 2R Acra Conc.	779.85
L	249.95	Navy Blue M3R	355.70	Blue 2R Powder Fine	675.30
B	2002.35	Brill. Blue MR	405.60	Blue BC Acra Con Pdr. Fine	1013.15
T	2459.45	Brill. Blue M RX	214.20	Blue BC Conc. Pdr. Fine	713.65
VG	143.00	Brill. Blue M-G	226.45	Blue R Conc. Pdr. Fine	719.70
CG	538.65	Blue M 4GD	369.40	Blue Conc. Powder	645.80
R	652.60	Navy Blue M RB	341.85	Brill. Blue 2R Hly. Conc.	378.55
		Turquoise M-G	240.30	Blue RR Supra Powder	629.35
		Brill. Blue M GX	516.25	Brill. Blue 2R Supra Disp.	115.65
COLOURS		Blue 3R Acra Powder	718.20	Dark Blue 2R Powder Fine	512.65
	Per Kg.	Dark Brown H 6R	248.45	Blue BC Supra Disp.	419.65
Golden Yellow HR	207.95	Cobalt Oxide	285.00	Jade Green XBN Powder Fine	555.80
Yellow H4G	145.65	Green H4BD	287.00	Jade Green XBN Acra	
Orange Yellow H-8GP	168.55	Green H-E4BI	169.80	Conc. Pdr	1026.05
Yellow HE6G	214.75	Red Brown H IF	143.25	Jade Green 2G Pdr. Fine	533.25
Yellow G-E4R	276.05	Orange Brown H 28	209.05	Jade Green 2G Ptg. Paste	125.40
Yellow H7G	332.30	Brown M GRN	188.80	Jade Green XBN Ptg. Paste	126.00
Yellow M4R	275.45	Black H-N	314.20	Jade Green 2G Supra Disp.	618.00
Yellow MGR	387.65			Olive D Pdr. Fine	563.90
Yellow M4G	201.15			Olive Green B Supra Disp.	421.70
Yellow M8G	366.10	SULPHUR COLOURS	Per Kg.	Jade Green XBN Supra Disp. (N)	327.30
Yellow M3R	244.70	Navy Blue	210.35	Olive OMW Powder Fine	698.55
Orange H2R	303.80	Green G	194.55	Olive OMW Supra Disp.	538.05
Red H7B	157.95	Black Grains Extra	72.25	Olive D Supra Disp.	361.70
Orange M2R	313.15	Black Grains OG	73.70	Olive R Supra Disp.	470.25
Red H8B	213.55	Black GXE Conc.	70.85	Olive D. Ptg. Paste	193.00
Scarlet H RN	245.05	Black GXE	57.90	Olive Green B Ptg. Paste	199.10
Orange Red H-3BP	179.80	Black GXR	69.40	Olive Green B Acra Conc.	741.10
Red H-F3B	243.45	Black Grains 800	62.80	Olive R Acra Conc.	779.85
Magenta HB	182.00	Black EXR Grains	73.70	Brown R Pdr. Fine	869.45
Red M 5B	160.05	Black EXR Grains 800	59.35	Dark Brown 3R Fine	826.25
Red M 8B	218.35			Brown G Supra Disp.	582.05
Pink MB	137.10			Brown 2G Supra Disp.	716.10
Magenta MB	163.65	VAT COLOURS (ICI)	Per Kg.	Brown R Supra Disp.	547.35
Purple H-3R	219.55	Yellow 5G Supra Disperse	561.85	Brown BR Powder	867.75
Purple H-7R	175.40	Yellow 5G Acra Conc	818.60	Dark Brown 3R Ptg. Paste	217.15
Blue H 3R	333.75	Gold Orange 3G Pdr. Fine	1158.45	Dark Brown 3R Supra Disp.	529.60
Blue H-GR	406.40	Brill. Orange 6R Pdr. Fine	624.35	Brown G Acra Conc.	967.95
Blue H5G	207.95	Gold Orange 3G Supra Disp	693.85	Brown M. Powder Fine	768.80
H 5RX	286.20	Brill. Orange 6RX Powder	394.30	Grey M. Supra Disp.	585.45
Blue H 7G	213.95	Brill. Red 3B Pdr. Fine	1214.15	Blue BC Acra Conc. Pdr. Fine	762.70
Blue H 7RX	358.15	Brill. Red 3B Supra Disp	867.45	Direct Black AC Supra Disp.	415.75
Turquoise HA	265.05	Brill. Purple 3R Acra Powder	827.05	Direct Black AC Pdr. Fine	574.70
Blue H-3RP	595.30			Direct Black CH Supra Disp.	490.45
Turquoise H 2G P	181.50			Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: APRIL 28, (NNS) A sharp fall of Rs. 10/11 per kg in camphor thal and powder provided the main feature of trading in the Delhi chemical market during last week, reports NNS. Menthol prices also dropped sharply by Rs. 25/35 in the hope of bumper crop prospect while titanium dioxide looked up further by Rs. 3/5 per kg in the absence of arrivals from Kerala. Turnover was good.

Camphor powder suffered a setback of Rs. 11 at Rs. 94 per kg on account of better supply along with comfortable stock position. It is noticeable that in the month of March '89, it was traded higher up to Rs. 125 per kg. Camphor thal tumbled down by Rs. 10 at Rs. 107 per kg in the absence of demand.

Menthol medium and bold suffered losses by Rs. 45 at Rs. 225 and Rs. 235 per kg respectively owing to dehoarding tendency by stockists in anticipation of ensuing bumper crop of mentha oil but later owing to fresh demand by buyers and poor inflow from U.P., they improved by Rs. 10 and were traded at Rs. 235 and Rs. 245 per kg respectively. Menthol flake dropped from Rs. 245 to Rs. 220 owing to nervous offerings. April delivery menthol flake declined from Rs. 245 to Rs. 220 per kg. Mentha oil was offered lower at Rs. 160 against Rs. 185 and DMO slipped from Rs. 82 to Rs. 75 per kg respectively

owing to huge stock position under the control of stockists. Lower advices from Sumbhol, Muradabad, Chandousi and Amroha mandis also subdued the market sentiment.

Citric acid slipped by Rs. 50 at Rs. 2,350/2,500 per 50 kg thanks to better supply along with slack off-take. Sodium nitrite moved up from Rs. 750 to Rs. 760 per katta caused by hike in its prices by Rs. 35 at Rs. 745 per katta by manufacturers. Caustic soda flake ruled static at Rs. 565/570 followed by higher advices from Bombay as well as good export demand.

Rangolite Germany rose again by Rs. 2 at Rs. 72 per kg in the absence of fresh import from Germany as well as negligible stock. Chatkolite China eased by Re. 1 at Rs. 60 due to slack off-take. Sufolite was not available in the market. Sodium hydrosulphite Gulshan was cheaper by 50 paise at Rs. 35 in the absence of demand by gur khandsari manufacturers.

Titanium dioxide anatase jumped up by Rs. 5 at Rs. 92 per kg on good stockists tendency along with absence of supply from Kerala. RC-822 grade also flared up by Rs. 3 at Rs. 100 per kg for the same reason. It is noticeable that the price of this commodity recorded a sharp rise of Rs. 22/27 per kg during a month. Paraffin wax advanced by Rs. 25 at Rs. 750 per bag.

Camphor Thal (Per Kg.)	107
Camphor Powder (Per Kg.)	94
Menthol Bold (Per Kg.)	245
Menthol Medium (Per Kg.)	235
Menthol Flake (Per Kg.)	220
Glycerine (Per Kg.)	48/50
Sodium Silicate (Per quintal)	250/300
Hexamine (Per Kg.)	36
Acetic Acid Glacial (Per Kg.)	16
Copper Sulphate (Per quintal)	2,400/2,600
Formic Acid (Per Kg.)	26
Formaldehyde (Per Kg.)	8
Hydrogen Peroxide (Per Kg.)	28
Calcium Carbonate (Per Tonne)	2,500/4,000
Acid Slurry Soft (Per Kg.)	24
Acid Slurry Hard (Per Kg.)	32
Phosphoric Acid (Per 50 Kg.)	960
Potassium Nitrate (Per quintal)	900/1,200
Potassium Permanganate (Per 50 Kg.)	3,350
Sodium Bichromate (Per 50 Kg.)	1,575/1,600
Trisodium Phosphate (50 Kg.)	550
Titanium Dioxide Anatase (Per Kg.)	92
Titanium Dioxide RC-822 (Per Kg.)	100
Zinc Oxide (Per metric tonne)	40,000/45,000
Phenol Carbolic Acid (Per Kg.)	37
Carbon Tetrachloride (Per Kg.)	21
Chloroform (Per Kg.)	28
Sodium Sulphate (Per metric tonne)	3,200/3,500
Naphthalene Balls (Per 50 Kg.)	1,450

DYES & COLOURS	(Per Kg.)
Naphthol AS	162
Naphthol ASG	252
Naphthol ASBS	250
Naphthol ASTR	325
Naphthol ASOL	208
Naphthol ASBO	225

DIRECT DYES	(Per Kg.)
Black E. Conc.	110/160
Diazo Black B.T.	105/135
Green B	100/127
Blue 2-B	60/92
Sky Blue FB	213
Basic Auramine	55/110
Basic Rhodamine	250/400
Basic Methylene Blue	92/130
Basic Violet	145/170
Basic Malachite Green	150/185
Acid Orange	45/22

(DELHI MARKET RATES AS ON APRIL 28, 1989)

Ammonia Bicarb (Per 25 Kg.)	135.00	Stable Bleaching Powder	
Mercury (Per flask)	12,400.00	Modi (Per 25 Kg.)	98.00
Soda ash (Per bag)	340/350.00	Sodium Bicarbonate (50 Kg.)	285/300.00
Ammonium Chloride (50 Kg.)	110/180.00	Sodium Hydrosulphite (Per Kg.)	35.00/40.00
Caustic soda flakes (50 Kg.)	565/570.00	Rangolite (Per Kg.)	60.00/72.00
Citric acid (Per 50 Kg.)	2,350/2,500.00	Boric acid Technical (Per 50 Kg.)	1,175.00
Stable Bleaching Powder		Paraffin Wax (Per 50 Kg.)	750.00
Shriram (Per 25 Kg.)	100.00	Tartaric Acid (Per 50 Kg.)	7,250.00
Stable Bleaching Powder KCl		Borax Granular (Per 50 Kg.)	670.00
(Per 25 Kg.)	95.00	Borax Crystal (Per 50 Kg.)	670.00
Stable Bleaching Powder		Sodium Nitrite (Per 50 Kg.)	660/760.00
Maruti (Per 25 Kg.)	90.00	Sodium Nitrate (Per 50 Kg.)	415.00

Madras Market

The steep increase in power cut 60% for HT consumers, intermittent stoppage of power, scheduled shedding, peak hour restriction have all crippled the industries in Tamil Nadu more particularly power intensive productions like caustic soda, calcium carbide, potassium carbonate etc. In respect of caustic soda the global situation has also triggered the price increase on an

all-India level and the prices have shot up to an all time high in all the markets during the week. Even the availability of HCl has been affected due to a continued strike at Chemplast. Carbon tetrachloride prices have gone up due to hike in price of the material by the manufacturers. But for these minor changes, the markets were otherwise steady and calm.

(MADRAS MARKET RATES AS ON APRIL 30, 1989)

Acetic Acid Glacial (per kg)	17.00	Calcium Carbonate (Precipitated) (per MT)	4,750.00
Aluminium Sulphate Iron free (per MT)	3,000.00	Citric Acid (per kg)	48.00
Ammonium Bicarbonate (per 25 kgs)	125.00	Copper Sulphate (per kg)	24.00
Ammonium Chloride (per MT)	3,000.00	Cresylic Acid 98-99% (per kg)	108.00+ED
Acid Slurry (per kg)	28.00	Pure Para Cresol 96% (per kg)	80.00+ED
Barium Carbonate (per kg)	6.00	Meta Para Cresol 42% (per kg)	47.00+ED
Barium Chloride (per kg)	5.50	Formic Acid (per kg)	27.00
Boric Acid Technical (per kg)	24.00	Formaldehyde (per kg)	8.00
Bleaching Powder (per 50 kgs)	220.00	Glue Flakes (per kg)	15.00
Borax (per 50 kgs)	650.00	Glycerine (per kg)	48.00
Caustic Soda Flakes -- Mettur (Chemicals) (per MT)	10,400.00	Hydrosulphite of Soda (TCPL) (per kg)	40.00
Caustic Soda Flakes -- Andhra (Sugars) (per MT)	10,400.00	Hydrosulphite of Soda (IDI) (per kg)	42.00
Calcium Chloride 70% Solid (per MT)	3,000.00	Hydrosulphite of Soda (BASF) (per kg)	42.00
Calcium Chloride Anhydrous (per MT)	6,000.00	Hexamine (per kg)	30.00
Calcium Carbonate (Activated) (per MT)	5,750.00	Hyflo Supercell (per kg)	20.00
		Hydrogen Peroxide (per kg)	29.00
		Litharge (per kg)	40.00
		Lead Acetate (per kg)	42.00
		Magnesium Carbonate (per kg)	19.00

Magnesium Chloride (per kg)	3.00
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	330.00
Oxalic Acid (per kg)	24.00
Paraffin Wax (per kg)	14.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	20.00
Polyvinyl Alcohol powder (per kg)	130.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	360.00
Soda Ash (TATA) (per 75 kgs)	360.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	12.50
Sodium Bisulphite (per kg)	4.20
Sodium Alginate (per kg)	200.00
Sodium Acetate (per kg)	7.00
Sodium Sulphate (Anhydrous) (per kg)	3.00
Titanium Dioxide (Anatase) (per kg)	75.00
Titanium Dioxide (Rutile) (per kg)	95.00
Trisodium Phosphate (per kg)	7.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	45.00
Zinc Chloride Powder (per kg)	12.00
Zinc Sulphate (per kg)	6.50

SOLVENTS

Acetone -- HOCL (per kg)	18.00
Butanol (per kg)	35.00
Butyl Acetate (per kg)	44.00
Benzene (per lit)	12.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	26.00
Diacetone Alcohol (per kg)	29.50
Diethylene Glycol (per kg)	45.00
Dichloroethane (per kg)	17.00
Di-octyl Phthalate (per kg)	48.00
Di-N-butyl Phthalate (per kg)	48.00
Ethyl Acetate (per kg)	20.00
Isopropyl Alcohol (per kg)	32.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	24.00
Methyl Ethyl Ketone (per kg)	45.00
Methyl Isobutyl Ketone (per kg)	38.50
Phenol (per kg)	35.00
Sorbitol (per kg)	16.00
Triethanolamine (per kg)	60.00
Trichloroethylene (per kg)	25.50
1-1-1 Trichloroethane (per kg)	27.00
Turpentine (per lit)	17.50
Toluene (per lit)	14.00
Xylene (per lit)	16.00

International Bulk Chemical Prices

Spot prices are as on April 5, 1989

Naphtha prices settled at \$181-183/ton cif after going up to \$ 188/ton. Ethylene and propylene remained stable with lack of materials available for trading. Butadiene prices rose to \$270-280/ton fob but very little business was con-

ducted. Benzene went further upto \$460-465/ton probably dragged by shooting toluene prices. Toluene continued rising to \$380-382/ton fob. Strong European demand and rising gasoline prices seems to spur toluene prices.

Paraxylene and orthoxylene came down to \$750-760/ton and 460-465/ton respectively following a sluggish market. Xylene and styrene remained stable. Despite a hike in gasoline prices methanol demand remained rather quiet.

Product	European Spot price range \$/ton	US price range \$/ton
Ethylene	875- 900 (cif)	738- 749
Propylene (100% basis)	588- 594 (cif)	440- 505
Butadiene	270- 280 (fob)	396- 418 (spot)
Benzene	460- 465 (fob)	453- 456 (spot)
Toluene	380- 382 (fob)	364- 370 (spot)
Xylenes (virgin)	465- 470 (fob)	448- 471 (spot)
(solvent)	460- 465 (fob)	n.a.
Styrene	1080-1090 (T2) (fob)	991-1035 (spot)
	980- 990 (T1) (cif)	
Paraxylene	750- 760 (fob)	n.a.
Orthoxylene	460- 465 (fob)	n.a.
Ammonia	168- 170 (c&f)	142- 150 (fob)
Methanol	165- 170 (T2) (fob)	163- 166 (fob)
	166- 168 (T1) (cif)	
Naphtha	181- 183 (cif)	n.a.

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx sailing date (5)
7/5	Eagle Moon (V-008)	F.F.C. Co.	Los Angeles (Harbour); Longbeach; Sanfrancisco; Oakland; Seattle; Vancouver (B.C.); Portland; New York; Boston; Norfolk; Baltimore; Charleston; Savannah; Miami; New Orleans; Houston; Montreal; Toronto; Fortworth; Chicago; Nashville; Atlanta; Philadelphia; Milwaukee; Kansas City; Phoenix; Gaum; Dallas; Cleveland; St. Louis; Cincinnati; Denver; Louisville; Memphis; Wilmington (B.C.); San Diego; Minneapolis; Indianapolis and Central American Ports; Honolulu. (Carting at Timber Pond No. 1).	11/5
7/5	Uni Pioneer (Voy-006)	Greenways	New York; Newark; Baltimore; Charleston; New Orleans; Houston; Boston; Providence (RI); Philadelphia; Norfolk; Savannah; Jacksonville; Wilmington; Miami; Montreal; Toronto; Bermuda; Los Angeles; Longbeach; Sanfrancisco; Oakland; San Diego; Stockton; Richmond; Almeida; Redwood City; Sacramento; Seattle; Portland; Vancouver (B.C.); Tacoma; Longview; Chicago; Dallas; various inland destinations and Caribbean Ports and S. American ports. (Carting at G/H Cotton Depot).	12/5
8/5	Ocean Sincerity (Voy-13 A/B)	O.S.A.	New York; Baltimore; Philadelphia; Houston; Boston; Chicago; Dallas; Atlanta; Savannah; Norfolk; Charleston; Los Angeles; Sanfrancisco; Oakland; Seattle; Vancouver; Toronto; Montreal; Portland; Tacoma and S. American & W. Indies ports. (Carting at M-178/180 Cotton Depot)	13/5

(2)	(3)	(4)	(5)
Hoegh Mary	Patvolk	Montreal and Toronto via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5)	14/5
Chandidas	S.C.I.	New York; Baltimore; Savannah (Direct) and other destinations.	17/5
Pavel Mizichevic	Marathon	Boston; New York; Baltimore; Norfolk	18/5
Pazin	Oceanic	Hodeidah; Jeddah; P. Said; Rijeka.	16/5
Uni Pioneer (V-005)	Greenways	Hamburg; Felixstowe; Rotterdam; Antwerp; Le Havre; Leghorn; Genoa; Marseilles (Fos); Valencia; Barcelona; Limassol; Las Palmas; Casablanca; Istanbul. (Carting at G/H Cotton Depot).	12/5
Vishva Siddhi	S.C.I.	Aqaba; P. Said and Med. Ports.	16/5
Seacrest Pioneer (Ger) (V-011)	Merzario	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 2).	16/5
Chandidas (Ind)	S.C.I./	Felixstowe; Hamburg; Rotterdam; Antwerp; Bremen; Liverpool; Le Havre; Manchester; Avonmouth; London; Belfast; Aarhus; Oslo; Copenhagen; Gothenburg; Helsinki and all inland destinations.	17/5
	Marine Trans	Felixstowe and inland destinations in U.K.; Rotterdam; Hamburg; Bremerhaven	
Pavel Mizichevic (Rus)	Transocean/	Tilbury; Avonmouth; Liverpool; Manchester; London; Felixstowe; Birmingham; Antwerp; (Rotterdam); Hamburg; Bremen; Copenhagen; Gothenburg; Oslo; Stockholm; Malmö; Leeds.	18/5
	I.S.S. Co.	Felixstowe; Tilbury; Antwerp; Rotterdam; Hamburg; Bremerhaven & Scandinavian ports via Hambur.	
Searcrest Pioneer	Seaspeed	West African Ports. (Carting at Hay Bunder No. 5)	16/5
Dansus	Sai Ship	Tema	12/5
Nikolay Semashko	Transocean	Singapore; Main Japan Ports.	15/5
Eagle Moon (V-008) (Ger)	F.F.C. Co.	Penang; P. Kelang; Singapore; Bangkok; Jakarta; (T. Priok); Hongkong; Manila; Busan; Keelung; Kaohsiung; Kobe; Yokohama; Nagoya; Osaka; Tokyo; Tsingtao; Dairen; Quangzhou; Whampoa; Shanghai; Hsingkang; Rangoon. (Carting at Timber Pond No. 1).	11/5
Uni Pioneer (V-006) (Pan)	Greenways	Singapore; Penang; Port Kelang; Bangkok; Djakarta; Surabaya; Manila; Cebu; Kaohsiung; Keelung; Osaka; Yokohama; Kobe; Shimizu; Moji; Nagoya; Pusan; Hongkong. (Carting at G/H Cotton Depot).	12/5
Ocean Sincerity (Voy-13A/B)	O.S.A./	P. Kelang; Singapore; Kaohsiung; Hongkong; Bangkok; Kobe; Yokohama; Nagoya; Moji; Osaka; Busan; Tokyo; Simizu; Keelung; Tsingtao; Quindao; Xiangang; Shanghai. (Carting at M-178/180 C.D. for O.S.A.)	13/5
	M.S.P.L.	Singapore; Bangkok; P. Kelang; Penang; Jakarta; Manila; Hongkong; Keelung; Kaohsiung. (Carting at Hay Bunder No. 4).	
L.M.Noble Lady	M.C.S./	Singapore; Surabaya; Djakarta and other Far East Ports.	19/5
	Silver Ship	Singapore; Fast East and Japan ports.	
Tulsidas	S.C.I.	Singapore and other Fast East Ports.	19/5
Eagle Moon	F.F.C. Co.	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Carting T.P. No. 1)	11/5
Ocean Sincerity	O.S.A.	Sydney; Melbourne; Adelaide; Brisbane; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting M-178/180 C.D.).	13/5
L.M. Noble Lady	Silver Ship	Sydney; Melbourne; Brisbane, Adelaide; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers.	19/5
Tulsidas (Ind)	S.C.I.	Melbourne; Fremantle; Adelaide; Sydney.	19/5
Seacrest Pioneer (V-011)	Merzario	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Kuwait; Bahrain; (Carting at 14-VD for Merzario)	16/5
Eagle Moon (V-008)	F.F.C. Co.	Dubai; Sharjah; Abu Dhabi; Doha; Muscat; Dammam; Riyadh; Bahrain; Kuwait. (Carting at Timber Pond No. 1).	11/5
Eagle Moon	F.F.C. Co.	Colombo. (Carting at Timber Pond No. 1).	11/5
L.M. Noble Lady	Silvership	Chittagong.	19/5
Tulsidas	S.C.I.	Colombo; Chittagong.	19/5

VESSELS DUE IN BOMBAY FOR IMPORT DISCHARGE

Date	Steamer's Name	Agents	From
	Ind. Valour	I.S.S. Co.	U.K. Cont.
	Ind. Progress	I.S.S. Co.	U.K. Cont.
	Ind. Goodwill	I.S.S. Co.	U.K. Cont.
	Jala Gopal	S.C.I.	U.S./Canada
	Sea Harvest	S.C.I.	Japan/Far East
	Vishva Asha	S.C.I.	Turkey/Const/B. Sea

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MATERIALS IMPORTED

(Contd. from the previous issue)

MADRAS

From 19-1-1989 to 28-2-1989)

ISOBUTYL BENZENE PURE :

SA: Chandra Pharmaceuticals Ltd., 68,285 kgs., Rs. 32,54,160.

ISOCYANATE: From FRG: Kothari Phytochemicals International, 5,760 kgs., Rs. 7,59,717.

ISOPHTHALIC ACID (AMOCO): From USA: Synthetic Resin Products, 3,062 kgs., Rs. 49,845.

ISOTRIDECYL ALCOHOL: From FRG: Kasturi Estates Ltd., 525 MTs., Rs. 13,533.

LABORATORY CHEMICALS: From USA: Apollo Hospitals Enterprises, 2 Nos., Rs. 254. Madras Medical Mission, 10 Nos., Rs. 3,630.

LACTOSE POWDER: From Netherlands: Kawaralal & Co., 19,000 kgs., Rs. 2,36,489.

LAURYL CHLORIDE: From USA: Peroxides India Ltd., 5,443 kgs., Rs. 2,35,690.

LAURYL PEROXIDE: From FRG: DCW Ltd., 2 MTs., Rs. 1,44,428.

LEAD DIOXIDE: From USA: & T Mcneil Ltd., 1 No., Rs. 787.

LINALOOL: From France: Aromatic India, 100 kgs., Rs. 13,49; From USA: Padmini Products, 907 kgs., Rs. 1,02,881.

LINALYL ACETATE: From France: Aromatic India, 25 kgs., Rs. 384; N. Ranga Rao and Sons, 10 kgs., Rs. 8,561.

L-LYSINE MONO HCL: From Korea: SKM's Energy Animal Feeds Pvt. Ltd., 8,000 kgs., Rs. 11,575.

LYSINE MONOHYDROCHLORIDE: From Korea: Sunnex Commercial (P) Ltd., 3,000 kgs., Rs. 1,96,408.

MAGNESIUM OXIDE: From Japan: Sundaram Industries Ltd., 500 kgs., Rs. 13,443.

MAGNESIUM OXIDE LIGHT: From UK: Samsons Rubber Inds. Pvt. Ltd., 500 kgs., Rs. 10,824.

META CRESOL: From Japan: A. M. Aromatics Pvt. Ltd., 16 MTs., Rs. 6,82,099.

METHYANYL ACETATE: From France: Vinaram Pvt. Ltd., 5 kgs., Rs. 611.

METHYL ACETO ACETATE: From USA: Siris Ltd., 35,536 kgs., Rs. 7,88,730.

METHYL CHLORO FORMATE: From Hungary: Pradeep Drug Co., 14,400 kgs., Rs. 2,73,181.

METHYL GLYCOL: From FRG: SIP Resins Ltd., 10,070 kgs., Rs. 1,62,805.

METHYL ISO BUTYL KETONE: From Netherlands: Nealand Laboratories, 13,200 kgs., Rs. 2,28,308.

METHYL ISOPROPYL KETONE 98%: From Japan: Amar Dye Chem Ltd., 1,120 kgs., Rs. 87,857.

METHYL TRIMETHYL CYCLO PENTYL: From Switzerland: Bush Boake Allen India Ltd., 5 kgs., Rs. 4,692.

MICROCRYSTALLINE WAX: From UK: MRF Ltd., 21.6 MTs., Rs. 4,26,370.

MONO CHLORO ACETIC ACID: From FRG: Chandra Pharmaceuticals Ltd., 50,994 kgs., Rs. 9,03,636; Priya Chemicals, 16.5 MTs., Rs. 3,13,327.

MONOCROTOPHOS TECH : From Switzerland: Gujarat Agro Industries Ltd., 16,280 kgs., Rs. 15,98,760.

MONO ETHYLENE GLYCOL: From UAE: Indian Organic Chemical Ltd., 2,500 MTs., Rs. 5,35,94,636.

MORPHOLINE: From FRG : Adithya Organics Pvt. Ltd., 4,000 kgs., Rs. 1,37,029.

MUSK KETONE: From Switzerland: Bush Boake Allen (I) Ltd., 300 kgs., Rs. 1,45,080.

A-ACETYL SULPHANILYL CHLORIDE: From Japan: Pancom Marketing Pvt. Ltd., 2,000 MTs., Rs. 97,443.

N-ACETYL SULPHANILYL CHLORIDE: From Japan: Priya Chemicals, 16 MTs., Rs. 7,79,541; SBI Foreign Exchange Dept., 51,000 kgs., Rs. 23,36,128.

N-PROPYLAMINE: From Belgium: Kothari Phytochemicals Ltd., 12,480 MTs., Rs. 3,18,197.

NEO PENTYL GLYCOL: From FRG: Biochem Industries, 16 MTs., Rs. 3,67,485; From USA: Clinfield India Pvt. Ltd., 9,072 kgs., Rs. 2,21,000; From FRG: Kopalle Pharma Chemicals Pvt. Ltd., 6,000 kgs., Rs. 1,44,561.

NICKEL OXIDE: From UK: High Energy Batteries India Ltd., 1,293 kgs., Rs. 2,25,260.

NITROMETHANE: From FRG: Chandra Pharmaceuticals Ltd., 9,072 kgs., Rs. 7,04,437.

OCTAMETHYL CYCLO TETRASILOXANE: From FRG: Anabond Pvt. Ltd., 3,000 kgs., Rs. 13,702.

ORTHO XYLENE: From Korea: Thirumalai Chemicals Ltd., 1,507,908 MTs., Rs. 1,52,67,121.

OXYTHIAZINE: From Japan: Tamil Nadu Dadha Pharm Ltd., 50 kgs., Rs. 1,62,883.

PARA DIMETHOXY BENZENE: From USA: McDowell & Co. Ltd., 300 kgs., Rs. 38,347.

**PARAHYDROXY ACETO PHE-
NONE:** From FRG: Newland Lab-
oratories Ltd., 1,500 kgs., Rs.
3,26,255.

**PARAHYDROXY PHENYL ACE-
TAMIDE:** From Japan: Meridian
Pharmaceuticals Ltd., 150 kgs.,
Rs. 1,09,922.

PHENYL ISOTHIOCYANATE:
From USA: Central Food Tech Re-
search Inds., 9 Nos., Rs. 11,600.

PHOSPHORIC ACID: From
USA: Madras Fertilizers Ltd.,
5,422 MTs., Rs. 3,51,49,278.

**PHOSPHOROUS PENTACHLO-
RIDE:** From FRG: Escorts Ltd.,
1,470 kgs., Rs. 1,27,538.

PIVALOYL CHLORIDE: From
France: TTK Chemicals Ltd.,
4,860 kgs., Rs. 3,35,285.

**POLYBUTYL TEREPHTHALA-
TE:** From Korea: Godavari Elec-
tronic Component, 1,000 kgs.,
Rs. 70,037.

**POTASSIUM SODIUM CUM-
ENE SULPHO:** From FRG: Uni-
pon Tanning Products Pvt. Ltd.,
1,500 kgs., Rs. 19,312.

PROPYLENE GLYCOL: From
FRG: Bush Boake Allen India
Ltd., 31,920 kgs., Rs. 5,83,195;
From Singapore: B. J. Chemical,
17.2 MTs., Rs. 2,22,596; Veeyor
Formulators, 5,160 kgs., Rs. 1,-
02,446; From USA: Bush Boake
Allen India Ltd., 50,310 kgs., Rs.
9,99,616.

PYRIDINE: From Belgium: IEL
Ltd., 30,400 kgs., Rs. 16,47,755.

ROCK PHOSPHATE: From
Jordan: The MMTC of India Ltd.,
35,400 MTs., Rs. 2,84,30,112.

SODIUM DICYANDIAMIDE:
From Switzerland: IEL Ltd., 250
kgs., Rs. 89,084.

SODIUM FORMATE: From Ita-
ly: Tamil Nadu Chemical Prod-
ucts Ltd., 200 MTs., Rs. 9,13,-

525; From Sweden: T.N. Chemi-
cal Products Ltd., 90 MTs., Rs.
4,65,898.

SODIUM FORMATE 77%:
From Spain: Vikas Udyog, 30,000
kgs., Rs. 1,23,076.

SODIUM METAL: From Japan:
Chandra Pharmaceuticals Ltd.,
8,450 kgs., Rs. 2,76,608; Priya
Chemicals, 8,450 kgs., Rs. 2,-
83,040.

SODIUM METHOXIDE: From
FRG: Dr. Reddy's Laboratories
Ltd., 9.600 MTs., Rs. 4,53,686.

SOYALECITHIN: From Singa-
pore: Nova Magnetics, 627 kgs.,
Rs. 31,884; From USA: Pantape
Magnetic Ltd., 200 Lbs., Rs.
17,145.

STEARIC ACID: From Indone-
sia: MRF Ltd., 34,000 kgs., Rs.
3,86,280; From Japan: Fenner In-
dia Ltd., 2,420 kgs., Rs. 58,953;
From France: Arvee Chem Phar-
ma Pvt. Ltd., 2 MTs., Rs. 1,14,-
810.

SULPHUR: From USA: The
MMTC of India Ltd., 10,485.206
MTs., Rs. 2,29,41,006.

SULPHUR INSOLUBLE: From
FRG: Sona Rubber Pvt. Ltd.,
2,000 kgs., Rs. 66,162; Stand-
ard Treads (P) Ltd., 2 MTs., Rs.
66,162; From Japan: Bantec Rub-
bers Pvt. Ltd., 1,500 kgs., Rs.
33,893; From Japan: Tecsum
Rubber Products, 1.500 MTs.,
Rs. 33,893.

SULFAMIC ACID: From Taiw-
an: Rao Insulating Co. Pvt. Ltd.,
10 MTs., Rs. 3,052.

TERPINYL ACETATE: From
USA: Padmini Products, 544 kgs.,
Rs. 32,717.

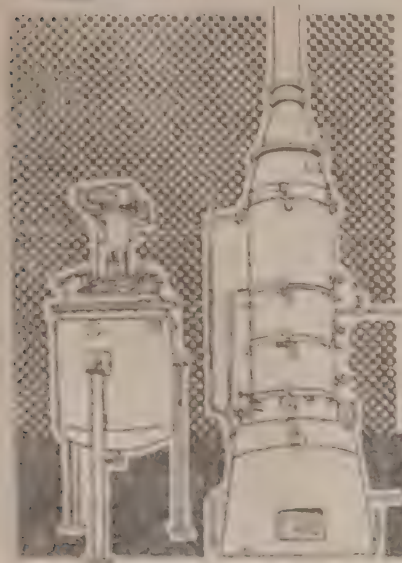
TERTIARY BUTANOL: From
Japan: IEL Ltd., 12,400 kgs., Rs.
2,73,753.

TETRAHYDROFURAN: From
FRG: Prakash Pipes & Inds. Ltd.,
99,645 kgs., Rs. 35,82,942.

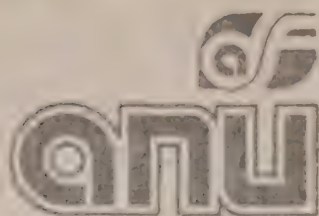
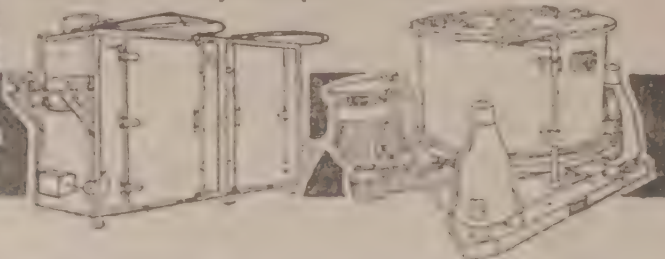
**TETRAMETHYL THIURAN DI-
SULFIDE:** From Taiwan: MRF
Ltd., 5,000 kgs., Rs. 2,35,994.

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THIOUREA: From FRG: IEL Ltd., 7.025 kgs., Rs. 2,21,404.

TITANIUM DIOXIDE: From FRG: Indian Organic Chemicals Ltd., 20,000 kgs., Rs. 8,19,128.

TITANIUM DIOXIDE RCR2: From Italy: Quinn India Ltd., 18,000 kgs., Rs. 6,86,514.

TRIAZONE HCL: From FRG: Micro Labs Ltd., 25 kgs., Rs. 89,660.

TRIMETHOXY BENZALDEHYDE: From France: Coastal Pharma Chemicals, 2,000 kgs., Rs. 7,70,406.

3,4,5 TRIMETHOXY BENZALDEHYDE: From China: Standard Organics Ltd., 2,000 kgs., Rs. 6,74,486; From France: Prasad Drugs Pvt. Ltd., 5,000 kgs., Rs. 17,00,527; Savera Laboratories Pvt. Ltd., 5,000 kgs., Rs. 17,00,527; From Netherlands: Inventaa Chemicals Pvt. Ltd., 1,995 kgs., Rs. 7,10,769.

3,4,5 TRIMETHOXY BENZOIC ACID: From Spain: Deccan Drugs Ltd., 10 MTs., Rs. 10,96,230; Inventaa Chemicals Pvt. Ltd., 10,000 kgs., Rs. 10,96,230.

TRIMETHYL PHOSPHITE: From USA: Indag Products Ltd., 14.651.212 kgs., Rs. 4,99,679.

TOLUNE DI ISOCYANATE: From Singapore: Swastik Pvt. Ltd., 19 MTs., Rs. 6,50,887; From USA: Joy Foam Pvt. Ltd., 15,974.40 kgs., Rs. 5,47,230; From USA: Pantape Magnetic Ltd., 500 Lbs., Rs. 30,594.

VANILLIN: From Switzerland: Bush Boake Allen India Ltd., 2,000 kgs., Rs. 4,52,195.

ZINC BORATE: From UK: Milton Rubbers Ltd., 11,000 kgs.,

ZINC OXIDE: From France: MRF Ltd., 20,000 kgs., Rs. 4,93,622.

ZINC STEARATE: From UK: Sundaram Fastners Ltd., 3,000 kgs., Rs. 90,433.

ZIRCONIUM OXIDE: From USA: Carborundum Universal Ltd., 10.051 MTs., Rs. 6,68,347.

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India Ltd., 10,000 kgs., Rs. 1,56,231.

LACTOSE IP/BP/USP: From Netherlands: Mahendra Amulakh & Sons, 3,000 kgs., Rs. 40,467.

LACTOSE IP/BP/USP 200 MESH: From Netherlands: Amulakh Kalyanji, 12,000 kgs., Rs. 1,61,871; Mahendra Amulakh & Sons, 9,000 kgs., Rs. 1,21,402; Pravin Amulakh & Sons, 12,000 kgs., Rs. 1,61,869; Raptakos Brett & Co. Ltd., 18,000 kgs., Rs. 2,74,367.

MEFENAMIC ACID BP 80: From Korea: Blue Cross Labs Ltd., 1,000 kgs., Rs. 1,82,905.

SODIUM STARCH GLYCOLATE BP/USP: From Hungary: Glenmark Pharmaceutical Pvt. Ltd., 300 kgs., Rs. 27,437.

SULPHADIAZINE BP: From China: N. R. Jet Pharmaceuticals Ltd., 500 kgs., Rs. 1,16,221.

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LLDPE RESIN: From Netherlands: Ecoplast Pvt. Ltd., 16 MTs, Rs. 3,24,351.

POLYPROPYLENE: From Belgium: J.K. Industrial Polymers, 795 MTs., Rs. 18,36,720; From Czechoslovakia: Associated Brothers, 98 MTs., Rs. 12,66,279; From France: Woodplast, 45,000 kgs., Rs. 8,96,084.

SYNTHETIC RESIN: From USA: Indian Aluminium Co. Ltd., 6,000 kgs., Rs. 1,78,332; From USA: The Mafatlal Fine Spg. & Mfg. Co., 18,000 kgs., Rs. 7,40,764.

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ACETIC ANHYDRIDE: From USA: Triochem Products Ltd., 15,268 kgs., Rs. 2,44,384.

ACRYLAMIDE: From Japan: L.N. Chemical Industries, 3,500 kgs., Rs. 80,021.

ADIPIC ACID: From FRG: Meh-ta Pharmaceutical Inds., 1 MT., Rs. 20,577.

2 B ACID: From UK: Sudarshan Chemical Industries, 1972.9 kgs., Rs. 1,68,398.

B-HYDROXYQUINOLINE: From France: Kirti Chemicals, 1,000 kgs., Rs. 1,94,089.

BETA NAPHTHOL: From China: Priya Chemicals, 30,000 kgs., Rs. 12,38,703.

BETA PICOLINE 98% MIN: From Belgium: Khojchem Pvt. Ltd., 15,010 MTs., Rs. 6,29,154.

BRIGHT YELLOW SULPHUR: From Kuwait: Sulphur Sulphurics
BROMINE LIQUID: From Netherlands: Indian Dyestuff Inds. Ltd., 22,680 MTs., Rs. 5,56,561; Tata Exports Ltd., 11,340 kgs., Rs. 2,78,281.

BUTANE: From Saudi Arabia: Indian Oil Corpn. Ltd., 4,478.370 MTs., Rs. 1,19,41,756.

2-6, BUTIDINE: From USA: Tata Consultancy Services, 180 kgs., Rs. 35,666.

BUTYL ACRYLATE: From Japan: Colour-Chem Ltd., 14,400 kgs., Rs. 4,32,441; Sabbri Textiles (P) Ltd., 14,400 kgs., Rs. 3,51,176.

2 BUTYL 1,4 DIOL: From FRG: Platewel Processes & Chemicals, 50 kgs., Rs. 3,226.

BUTYL GLYCOL: From UK: Kantilal Manilal & Co., 9,620 kgs., Rs. 1,83,682.

CALCIUM CARBONATE: From France: B. M. Thakkar & Co. P. Ltd., 19,200 kgs., Rs. 93,118.

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2-CHLORO ETHANOL: From Japan: Srinivas Chemicals Inds., 1,08,500 kgs., Rs. 29,84,902.

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CYCLOHEXANONE: From FRG: Sudarshan Chemical Inds., 14,820 kgs., Rs. 3,37,823.

D-ALPHA PHENYL GLYCINE CHLORIDE HYDRO CHLORIDE: From Netherlands: Ranbaxy Labo-

atories Ltd., 17,325 kgs., Rs. 60,09,762.

DESMODUR RF: From FRG: Prakash Footwear Industries, 225 kgs., Rs. 48,966.

DIETHYL CARBAMYL CHLORIDE: From FRG: Tata Exports Ltd., 1,140 kgs., Rs. 85,804.

DIETHYLAMINE 2 PROPYNE: From FRG: Grauer & Weil (India) Ltd., 80 kgs., Rs. 32,481.

DIETHYLAMINO 2 PROPENE: From FRG: Platewel Processes & Chemicals, 160 kgs., Rs. 64,962.

DIMETHYL DICHLOROSILANE: From FRG: Cepham Organics Ltd., 3,000 kgs., Rs. 1,03,223.

DIMETHYL FORMAMIDE: From FRG: Indian Dyestuff Inds. Ltd., 15,200 kgs., Rs. 2,98,109.

DIMETHYL OCTANOL: From UK: The Tata Oil Mills Co. Ltd., 3,060 kgs., Rs. 3,98,748.

1-3 DIMETHYL UREA: From FRG: Pefco Industries Ltd., 3,750 kgs., Rs. 73,162.

DL2 AMINOBUTANOL: From FRG: Lupin Laboratories Ltd., 30,420 kgs., Rs. 35,80,800.

DL METHIONINE: From USSR: Seva Enterprises, 2,000 kgs., Rs. 1,42,058.

D(-) P HYDROXY PHENYL GLYCINE: From Netherlands: Armour Chemicals Ltd., 2,000 kgs., Rs. 6,58,152.

EPICHLOROHYDRIN: From FRG: Cibatul Ltd., 18,400 kgs., Rs. 4,90,795.

ETHOXY METHYLENE DIETHYL MALONATE: From France: E. Merck India Ltd., 5,580 kgs., Rs. 10,71,638.

3 ETHOXY PROPYLAMINE: From FRG: Indian Dyestuffs Ind. Ltd., 3,060 MTs., Rs. 2,44,794.

ETHYL CYANO ACETATE: From Japan: Indian Dyestuff Ind. Ltd., 1 MT., Rs. 99,073.

ETHYL GLYCOL: From USA: Asian Paints (India) Ltd., 18,000 kgs., Rs. 3,55,292.

ETHYL GLYCOL ACETATE: From USA: Asian Paints Ltd., 18,800 kgs., Rs. 4,39,855.

2 ETHYL HEXYL ACRYLATE: From FRG: Paradise Chemicals, 3,600 kgs., Rs. 1,06,999.

ETHYL HYDROXY ETHYL CELLULOSE: From Sweden: Garware Paints Ltd., 2,000 kgs., Rs. 1,29,557.

ETHYL MERCAPTAN: From Netherlands: Cyanamid India Ltd., 38,000 kgs., Rs. 8,63,006.

ETHYL THIOETHANOL: From Belgium: Kemwell Pvt. Ltd., 2,000 kgs., Rs. 73,162.

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FURFURYL ALCOHOL: From Belgium: Ranbaxy Laboratories Ltd., 2,640 kgs., Rs. 73,436.

GAMMA NON LACTONE: From Netherlands: Gogia Chemical Inds., 250 kgs., Rs. 80,021.

GUM ROSIN: From Indonesia: Bombay Paints & Allied Products, 10,000 kgs., Rs. 80,021.

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1-6 HEXANE DIOL: From FRG: Indian Dyestuff Inds. Ltd., 5 MTs., Rs. 2,90,315.

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HYDROXYLAMINE HYDROCHLORIDE: From Japan: Chemical Centre, 500 kgs., Rs. 42,794.

8 HYDROXY QUINCLINE: From France: Eskay Fine Chemicals, 1,500 kgs., Rs. 2,94,915.

ISGBORNYL CYCLOHEXANOL: From France: The Tata Oil Mills Co. Ltd., 2,200 kgs., Rs. 3,72,211.

ISOCYANATE: From Singapore: Kelvinator of India Ltd., 17,2368 MTs., Rs. 5,91,129; From USA: Kelvinator of India Ltd., 17,2368 MTs., Rs. 5,91,129.

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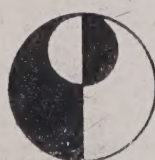
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